Measuring the Effectiveness of Fire Safety Classes for Primary School Children

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I used the language, ideas, expressions, or writings of another.

Signed:______________________________
Abstract

Marysville Fire District needed to know how effective its fire safety program was in Marysville School District, which has been under pressure either to demonstrate student proficiency or face funding cuts. The focus of this research was to propose a tool to assess the efficacy of local fire prevention education by considering the current educational climate, understanding what tools are appropriate to primary grades, surveying similar evaluation tools in other agencies’ fire safety programs, and integrating the recommendations from fire and education professionals. A literature review, questionnaires and discussions with key individuals led to the conclusion that the Marysville Fire District could raise the effectiveness of fire prevention education by testing students before and after fire safety classes.
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Measuring the Effectiveness of Fire Safety Classes for Primary School Children

Many fire departments in the United States have provided fire prevention education in the communities they serve (National Fire Prevention Association [NFPA], 2004). Departments often may not have adequate evidence to measure the effectiveness of fire prevention programs without a process in place. Without performance benchmarks, stakeholders cannot adequately measure the program’s benefits or shortcomings. However, evaluation tools have been used in school districts increasingly in recent years to measure student understanding and positive academic changes (Washington State Office of the Superintendent of Public Instruction [OSPI], 1999).

The Marysville Fire District (MFD) needed to know if its current fire safety training in Marysville School District (MSD) produced positive behavior changes in the children who receive the training in kindergarten, first, and second grades (K-2). The number of fire injuries and deaths from year to year among the children in MFD was too small to constitute a statistically significant sample for analysis (Marysville Fire District [MFD], 1999-2006). The purpose of this descriptive research, therefore, was to identify and propose an assessment tool for the MFD and its community safety partner MSD to gauge the efficacy of their collaborative elementary school fire prevention program.

Descriptive research was used to discover (a) what considerations should be given to conducting fire prevention evaluations in elementary schools, (b) what impact evaluation instruments are appropriate for elementary school students, (c) how other agencies evaluate the impact of their fire prevention education programs, and (d) what education and fire professionals recommend to evaluate the effectiveness of the MFD delivery of elementary school fire prevention education programs.
Background and Significance

MFD is comprised of 75 full-time and 25 part-time members who staff four stations to protect and serve 60,000 residents living in 54 square miles of Snohomish County, Washington. In 2006, MFD responded to 8,400 alarms. MFD provides fire prevention, fire suppression, emergency medical care with transportation, technical rescue, hazardous materials technical support, code enforcement, and fire investigation services. With the exception of fire prevention staff, all firefighters are assigned to 24-hour shifts. The fire prevention division is made up of one fire marshal, one assistant fire marshal, one firefighter/inspector, and one public information/education officer (MFD, 2006). MFD has taught fire safety classes in the MSD since 1995 (MFD, 1999).

According to, Sybil Martin, the MSD Administrative Assistant to the Superintendent, approximately 5,000 children attended 10 public elementary schools in MSD in 2006 (personal communication, May 31, 2007). In the same period, MFD education officer, Stephanie Price, estimated that MFD delivered fire safety instruction to 1,200 children in grades K-2 at the request of MSD schools (personal communication, June 20, 2007). Each classroom encounter was limited to about 20 minutes, supplemented by engine visits to the schools, and class field trips to MFD stations for tours. The fire prevention education delivered to children in the primary grades currently was not formally measured by either the school staff or the fire safety educator.

Traditionally, firefighters deliver a range of messages to children, including stop, drop, and roll, crawl low in smoke, and escape planning—all of which could save their lives and the lives of others if the lessons are learned well. At present, little time is dedicated to the demonstration or evaluation of behavior changes in children following lessons and presentations, and none is documented. Further, there is little follow-up with classroom teachers regarding the effectiveness of the fire prevention lessons that were presented. Without a means of measuring
what the children learned, MFD and MSD are not able to verify the children’s positive behavior changes. These facts support the need and use for development of a testing tool used relative to fire prevention education.

Increasing budget pressures in both MSD and MFD add fuel to local debate regarding the value of fire prevention education in the primary age groups. Discussion topics include the lack of evidence to show the extent of learning comprehension in young children; new demands on teachers to demonstrate student achievement through standardized state tests, edging out the classroom time spent on fire safety; and the fiscal challenge inherent in discovering or designing best practices for measuring the effectiveness of MFD fire prevention activities with no new resources.

The desired result of this research project is to identify the need and the means for measuring and improving fire prevention education programming in MFD. In addition, this directly relates to one of the United States Fire Administration’s (USFA) operational objectives by reducing the loss of life from fire among children age 14 years and younger (United States Fire Administration [USFA], 2007).

This research project is linked to the Leading Community Risk Reduction (LCRR) course at the National Fire Academy (NFA), which provides the Executive Fire Officer the necessary skills to lead a community risk-reduction process. This course notably emphasizes that change begins with a vision for the future. Further, community risk reduction means that a community assesses its fire risks and hazards, and then develops and implements specific intervention strategies to address those risks and hazards (National Fire Academy [NFA], 2007). The aggregate community of Marysville depends on MFD to protect and serve all residents, including the most vulnerable populations. The multiple nuclear communities within MFD depend on firefighters to teach fire safety to children as a deterrent to loss of life and property. Thus, this
research paper is designed to address a specific fire problem within the purview of MFD, to strengthen the MFD partnership with MSD, and to gain influence in the community by demonstrating MFD’s proactive commitment to safety and service.

Literature Review

The purpose of this literature review was to gather information on the subject of fire prevention education. Specifically, what considerations should be given to conducting fire prevention evaluations in elementary schools and what kind of evaluation instruments are appropriate for elementary school students. Finally, to discover how other agencies evaluate fire prevention programs might benefit the partnership between MSD and MFD.

The first area of research dealt with current practices of evaluation systems used in public education. An evaluation system must not only include the end assessment of the instruction, such as a final exam, but also assessments of the smaller units of instruction, which are really the block-by-block foundation of learning. The final exam kind of assessment is called *summative*, and the incremental appraisal is called *formative* (Bloom, Hastings, & Madaus, 1971).

Formative evaluation occurs while the student is actively learning. Summative evaluation focuses solely on the end result of learning. To put it another way, formative evaluation helps the learner and the teacher focus on a particular aspect of the process, while summative evaluation is directed towards the general assessment of overall learning. Bloom et al. (1971) suggested that summative evaluation is an overall judgment of the effectiveness of learning or instruction and formative evaluation is used during the instruction in such a way that remedial learning is identified.

William K. Trochim (2002) further defined the role of evaluation in education in his discussion of social research methods. According to Trochim, the basic goal of evaluation is to provide useful feedback to a variety of audiences. Often, empirically driven feedback is viewed
as useful if the feedback helps in a decision-making or policy formation process. Trochim suggested that formative evaluations help to improve the object being evaluated by examining the delivery of the program, implementation quality, and assessment of context, procedures, and input.

Thomas Kubiszyn and G. Borich (2003) described the purpose of tests as a way to gather objective information that can be used in conjunction with subjective information to make better educational decisions. Further, Kubiszyn and Borich thought that in the age of increasing teacher accountability, instructors need to define what they want to measure in order to guide how instruction should be delivered.

According to research professors Robert Linn and Norman Gronlund (2000), the ultimate purpose of testing or assessment is to improve student learning. Further, fair testing will ensure learning and also enrich the student-teacher relationship. It is important to create and use performance measurements--if not, it is hard to differentiate success from failure (Owens, 2006).

According to the student manual used for the LCCR course (NFA, 2007), the benefits associated with evaluation include identification of program effectiveness, identification of where resources should be directed, building community support for funding to continue useful programs, documentation for others of what succeeded and what failed, identification of problems in the program to correct design, revising accordingly, and reallocation of resources from ineffective programs. This evaluation data should also be used to guide risk-reduction decisions, determine if outcomes are linked to intervention strategies, and--in the case of publicly funded agencies--provide objective proof to citizens and elected officials that a given program reached and served the intended audience.

W. James Popham (2005) believed too many teachers form habits of assessment patterns without giving serious consideration to why they are assessing a particular area. Further, teachers
test students in order to dispense grades in a manner that somehow resembles the levels of academic performance that students have displayed. In determining what to assess, Popham suggested placing emphasis on instructional objectives, national content standards, assessment blueprints, and views from other colleagues. One should also consider the potential assessment targets such as cognitive, affective, or psychomotor. Cognitive assessment tests the student’s ability to solve a problem or make a decision. Affective assessment evaluates attitudes, values, and risk-taking tendencies. Psychomotor assessment tests a student’s muscle coordination and dexterity. Further, Dr. Annette Blake (2007) believed testing in any form is vitally important to the learning process. Dr. Barbara Terry (2007) found that alternative methods of testing have raised control group scores higher than nationally standard tests in some cases.

Popham (2005) wrote that anyone who has been to school has encountered a multitude of tests, typically final examinations, mid-term exams, unit tests, and pop-quizzes. All of these tests had one thing in common: They were instruments that provided quantifiable information to teachers about each student’s knowledge of a particular subject. Historically, these were paper and pencil essay tests, multiple-choice tests, yes/no tests, and true/false tests. Popham maintained that today’s teachers need broader types of assessments that provide a greater range of feedback about a student’s knowledge, skills, and abilities. One example of an assessment broader than the traditional paper and pencil tests is an oral exam that may be used to determine how well a student can perform in a socially interactive setting.

According to the LCCR manual (NFA, 2007), the next step after identifying the community risk, population, and intervention strategies is to identify the three levels of program evaluation: process, impact, and outcome. The process level measures outreach, benchmarks, program strengths and weaknesses. Impact evaluation gauges the learning or behavior change that has occurred in the target audience, and in legislative change, such as revision of fire codes.
The measurement in outcome evaluation may be ongoing, long-term statistical tracking to
determine effectiveness. Linda Nolan (2007), Director of Instructional Services for School City
of East Chicago, Indiana, said that children have the ability to learn. The challenge is putting all
the pieces in place that will let each of them overcome all the things that are holding them back.

Popham (2005) asserted that the educational system is completely dominated by
standardized tests, which are used to measure the performance of school systems, teachers, and
students. Every public school in the United States is held accountable for how well students
score on these tests by the No Child Left Behind Act (NCLB, 2001). Popham said that many
teachers feel that serious educational harm will result from what he called a misuse of
standardized tests. The NCLB (2001) set the target year of 2013 to have 100% of all students
achieve test scores at the proficient level or above. Schools that fail to demonstrate annual yearly
progress will be labeled as inadequate. If those schools receive Elementary and Secondary
Education Act (ESEA, 2007) funding, severe sanctions are placed on the school.

In the 1976-1977 school year, Congress first required public schools to document the
number of children who had learning disabilities (LD). In 2002 Lyon said that students identified
as LD had risen nationwide from 1.8% to 2% since 1977, and LD students accounted for more
than half of all students enrolled in special education programs.

Popham (2005) made the case that traditional reasons to conduct assessments include
diagnosing strengths and weaknesses, monitoring progress, assigning grades, and determining
instructional effectiveness. In addition to the traditional reasons to assess, educators conduct
assessments because test results can determine public perceptions of educational effectiveness.
With that, student assessment performances are increasingly seen as part of the teacher
evaluation process used to clarify instructional intentions and improve instructional quality, but
also now to discern school and school district competencies and connect those to funding (Lyon, 2002).

According to Linn and Gronlund (2000), tests and assessments may be given at the beginning of an instructional segment to determine whether the students have the prerequisite skills and readiness for instruction, or for monitoring learning progress. Tests given at the end of the instruction can determine if learning outcomes have been achieved.

Deme Clainos (2004) stated a common practice is to use a commercially developed, norm-referenced test for grades K-2. Dabney (2006) stated that once pretests and posttests are given, results should help students work at their own pace to complete essential standards.

Popham (2005) commented that teachers most frequently use one of two types of assessment strategies: norm-referenced measurement, and criterion-referenced measurement. Norm-referenced simply means each student’s performance is compared to other students’ performance, or the norm. Criterion-referenced means the student’s performance is based on mastery of the assessed material. Regardless of which type of evaluation is used, the classic pretest and posttest approach is an excellent measurement of instructional impact. This technique has consistently provided valuable data about student knowledge before instruction and student knowledge following instruction.

It is important to note here that the scholarly literature was basically about evaluating general education in a classroom setting. The citations specifically about fire prevention education encompass a range of tactics and presentation venues. Conversation with colleague firefighters at NFA provided anecdotal confirmation that some fire agencies use programs that include evaluation of each child’s comprehension and demonstration of fire safety messages.

Fire agencies have approached fire prevention education in different ways: (a) Risk Watch Safe Community (Riskwatch Community Safety Program, 2007) multimedia programs
were created with the goal of reaching as many children as possible with life safety messages. According to NFPA (2007), communities in 33 states have participated in the program; (b) *Safe Kids Worldwide* (Safe Kids Worldwide, 2007) is an international nonprofit organization dedicated to preventing unintentional childhood injury. The organization was founded in 1987 by Children’s National Medical Center and Johnson & Johnson Company. With more than 450 coalitions in 16 countries, the *Safe Kids Worldwide* mission is to educate and legislate for the purpose of injury prevention in children 14 and under; (c) *play safe! be safe!* is a multimedia fire safety education program sponsored by BIC Corporation ([play safe! be safe!], 2007). Workshops are designed to give fire safety educators the tools needed to effectively teach fire safety to preschool age children.

Some fire departments have built *Safety Towns* to deliver safety-related messages (Frisco Fire Department, 2007). The structures are built to scale to provide interaction and maximum understanding of fire safety concepts. In Prince George, Virginia, a mobile fire safety vehicle called the FIRE Bus was built to take fire prevention messages to children in the community (Brown, 2001). The bus went into service in 2002 and continues to provide safety messages to the community’s students in grades K-4.

In summary, the review of literature presented a wide range of approaches to evaluation of education in the elementary school setting. One must consider and compare the merits of a formative or summative process (Bloom et al., 1971), the needs of teachers for information about the knowledge level of their students (Popham, 2005), and recent regulatory requirements such as the NCLB (2001) and LD children (Lyon, 2002). All these considerations must inform the selection and development of evaluation instruments for fire prevention education at the elementary school level.
Many types of tests are available for use in elementary schools. Some commercially
developed programs created by educators and fire safety specialists provide effective testing
instruments.

Research does not suggest a definitive method with which to deliver fire prevention
education at the elementary school level. However, research is conclusive that testing is a widely
used and accepted practice in educational fields, and that testing is a proven means of measuring
what has been learned by the student (Linn & Gronlund, 2000).

Procedures

The procedures for this applied research project were started during this author’s
participation in the February 2007 LCCR course at the National Fire Academy (NFA) in
Emmitsburg, Maryland. Information was gathered through interviews, coursework, and
discussion with fellow classmates and instructors. An initial literature search was undertaken at
the NFA Learning Resource Center (LRC) using the online card catalog to determine the existing
research into the author’s proposed research topic, both to avoid duplication and to refine the
scope of unanswered research questions. Search keywords fire prevention, safety, and education
revealed a list of materials relevant to the use of tests at the elementary school level for fire
prevention education. Approximately 20 articles were retrieved and reviewed, and 5 books were
checked out and studied for the 2 weeks of class on the NFA campus. The knowledgeable LRC
staff assisted in demonstrating the most effective ways to use the LRC and offered instruction in
accessing the LRC’s holdings after students have left the NFA campus.

During the author’s time at the academy, 8 classmates were asked how their
organizations measured fire prevention education at the elementary school level. Through
informal interviews and valuable discussion with each of them, many ideas and questions
emerged for development of this project. The class roster provided contact information for further networking and destination fire departments in the event a survey became necessary.

The MFD library of 50 fire service books advanced the topic research upon the author’s return to fire duty. Approximately 10 hours of internet searches discovered more articles and Web sites pertaining to fire prevention education at the elementary school level.

The literature search at this stage turned up no or insignificant or old input from public school sources and fire prevention educators. Guided by this shortcoming, it was decided that surveying elementary teachers and fire prevention staff would be the most expedient way to ensure the currency and usefulness of the research project. Before launching in that direction, the MSD Public Information Officer/Education Officer (PIO) was consulted regarding current educational outreach programs and initiatives at MFD. Additionally, the PIO, Stephanie Price, was interviewed for her professional experience and opinions about the value of tests and best practices for improving fire safety education in the elementary school level (personal communication, June 5, 2007).

Questionnaires were developed to solicit responses from the K-2 teachers of MSD (Appendix A) and select fire departments outside MFD (Appendix B).

The author arranged a schedule of 3 in-person and telephone visits to the MSD Superintendent’s office, and 10 to the principals of all MSD’s elementary schools to better understand the MSD perspective, MSD organization, and MSD curriculum requirements. MSD representative Sibyl Martin, the Administrative Assistant to the Superintendent, offered practical advice about best tactics and timing to deliver and retrieve questionnaires from MSD teachers (personal communication, June 1, 2007). Further, Ms. Martin communicated the support of the Superintendent’s office by e-mail to all the MSD elementary schools, and requested their cooperation with the questionnaires.
The personal contacts not only strengthened the existing partnership between MSD and MFD, it also affirmed MSD cooperation in the research project and engaged the staff in understanding the MFD perspective on the value of fire safety education. Equally important, the visits were essential to discerning the salient survey questions to present to all faculty who taught K-2 in the school district.

Out of regard for the teachers’ limited available time to respond to a survey, and to ensure a high return rate, the survey questions were written for relevance and brevity. The optimal question formats required yes/no response, or a multiple-choice selection. Sufficient space also was provided on the survey form for respondents to note their ideas and observations related to the study topic (Appendix A).

The same reasoning and format decisions applied to development of the fire department questionnaire (Appendix B). Draft questionnaires were vetted by 6 MFD co-workers, and the results from this feedback were incorporated in the final version of the survey.

The MSD received 10 paper questionnaires hand-delivered to each of the 10 elementary schools in Marysville, and were asked to respond within 2 weeks (Appendix E). Sixty-four teachers completed questionnaires within 1 week.

Forty fire departments in 26 states and 1 Canadian province each received a questionnaire via e-mail and were asked to return their replies within 4 weeks (Appendix F). Nineteen fire departments returned completed surveys.

Results

The results of this study indicate that there is a need to measure the effectiveness of fire prevention education in elementary schools. The way this is done may vary from agency to agency, but all share the common goal of saving lives and reducing injuries. The MFD criteria for fire prevention lessons have been long-established. However, there is no process to ensure
that the lesson objectives have been met. Other fire agencies’ use of a testing process in conjunction with fire prevention education is inconsistent across the country. Answers to the following research questions will help to determine the best course for the MFD.

Research Question 1 Results

The research indicated the considerations for conducting fire prevention impact tests at the elementary school level include determining the uses of evaluation for the student and the school with consideration for the NCLB (2001). This federal legislation caused school systems to be inundated with standardized testing and created performance pressure and time constraints for students, teachers, and school systems.

The uses of evaluative data for the student must be considered before designing the evaluative instrument. If the uses are to measure the end result of instruction by providing summative data, outcome and impact evaluations are appropriate. If the uses are to assist the instructor in collecting formative data, then needs assessments and process evaluations are options. The uses of the evaluative data for school and fire organizations tend to focus on building or maintaining support by identifying program effectiveness. Evaluative data provided documentation of what worked and what failed as well as an objective measurement from which decisions are made about future risk-reduction programs.

The results from the fire organization questionnaire revealed that 94.7% of the responding fire agencies provide fire prevention education to K-2 children (Appendix D, Table D1), but more than half (57.8%) do not have a process in place to evaluate the effectiveness of their elementary school programs (Appendix D, Table D2). The results also showed that of the 42.1% of fire organizations having an evaluation process in place, 94.7% said it was well-received by teachers (Appendix D, Table D5).

Research Question 2 Results
Following the decision to select a formative or summative classroom assessment or evaluation instrument, a decision should be made considering how to assess. Recalling the two kinds of assessments, norm-referenced measurements provide data about a student’s performance in relation to other students. Criterion measurements simply measure the student’s performance based on how many right or wrong answers are provided (Popham, 2005).

The next decision to consider is how to elicit students’ responses. Almost all of the common instruments are appropriate for elementary school students. These constructed tests, according to Popham (2005) include binary choice, multiple binary choice, multiple choice, matching, short answer, and essay. Each test instrument has advantages and disadvantages that should be considered in the instructional design.

The research showed that the fire agencies that evaluated their fire prevention outreach preferred question-and-answer format (57.8%) over all the other choices, and 21% indicated they used activities to demonstrate learning (Appendix D, Table D4). Similarly, the teachers indicated that question-and-answer format was their most popular choice of test (53.1%), followed in distant second place by true-false tests (29.6%); demonstration of skills was endorsed by 15.6% of the teachers (Appendix C, Table C4). The complete breakdown of what types of evaluation instruments were favored by teachers are listed in Appendix C, Table C2, and those used by fire departments are listed in Appendix D, Table D4.

Research Question 3 Results

Fire organizations used their evaluation data in various ways, as depicted in Appendix D, Table D6. Tied for top choice, 26.3% said that the data provided proof that learning occurred, and the same percentage said the collected data provided feedback to use for instructional adjustment. The next most-popular uses were to measure organizational effectiveness (21%), and to help justify fire prevention to the organization (21%). Only 15.7% used the data to provide
justification to schools regarding the usefulness of fire prevention education, and 1% said the data collected provided evidence that positive behavior changes occurred.

**Research Question 4 Results**

The research indicated that 94.7% of fire organizations that returned the questionnaire delivered fire prevention education at the elementary school level. However, only 42.1% of those had a process in place to test what the child had actually learned from the session (Appendix D, Table D1).

Most teachers (98.4%) felt that fire prevention education had instructional value in elementary schools (Appendix C, Table C1). However, only 32.8% of that majority felt that an evaluation tool was necessary to ensure learning had occurred (Appendix C, Table C4).

Teachers and fire prevention educators differed in their respective preferences for when to test. Only one fire department gave a pretest, 42% said that they gave only a posttest, and 21% said that they gave both a pretest and posttest during fire prevention education events (Appendix D, Table D5). The teachers survey results showed 1.5% in favor of a pretest only, 40.6% for a posttest only, and the majority (59.3%) preferred testing both before and after fire prevention training (Appendix C, Table C3).

Teachers were split on the question of who should do the testing, with 59.3% indicating the classroom teacher should administer testing, and 51.5% selecting the fire prevention educator (Appendix C, Table C5).

**Discussion**

**Relationship Between Study Results and Literature**

The literature supported the theory and practice of testing students to ensure lesson objectives have been learned. According to Clainos (2004) the outcomes of pretesting and posttesting were successful at the elementary school level. This is similar to another study
conducted by Dr. Annette Blake (2007) that found the value of pretests and posttests at the elementary level was critical for continued program effectiveness. Furthermore, the Public Fire Education Planning Guide (Federal Emergency Management Agency [FEMA], 2002) lists evaluation of a program’s result and processes are crucial in determining if the program’s goals have been achieved and essential for future planning. A study conducted at Mesquite Elementary School in Tucson, Arizona (Dabney, 2006) found that students are better equipped to meet standards with the help of testing before and after a learning session.

The literature, however, fell short of addressing the particular topic of fire prevention education and testing. The literature search also failed to discover sources or studies that addressed joint teaching endeavors, such as the partnership that exists between MFD and MSD to teach fire prevention skills to the youngest grade school children. Further, the impact of NCLB and LD needs on K-2 curricula promised to turn into an entirely separate research project, and would need to be examined more thoroughly to advance this one. It became necessary to apply the general theories to our specific situation, which in turn highlighted the need to seek additional information through interviews and a survey instrument.

The literature review showed little scholarly evidence to support the difference a K-2 testing procedure may make in a real-life situation calling for a child to apply the tested material. That is, pretests and posttests only can measure the child’s learning on the test day in a controlled setting. If the child were to be involved in an actual emergency fire event, it is unknown if he or she could react in a way that could save life.

Another limitation was the scarcity of information available about fire setters. This research project would have been enriched by understanding what influence fire prevention education had on fire setters. Long-term studies and data collection about fire setter motivation
and fire safety education would inform current programming and could shape new programs to
deter arson.

After examining the evidence and the research conducted by educators and fire
prevention specialists one can surmise there are multiple ways to measure the effectiveness of
fire prevention at the elementary school level. It appears that the final step of the community
risk-reduction model (FEMA, 2002), that is, an evaluation of the program’s results and
processes, is not being applied in many organizations and MFD is no exception to this pattern.

Interpretation of Results

The results of this study lead this author to conclude that MFD, like many agencies, has
not made the measurement of fire prevention education a priority. This author feels that this has
been due in part to a longstanding belief that there is no real way to measure the effectiveness of
primary prevention activities in the fire service. Fire safety behavior is taught around the country
every day with little consideration given to measurement value. Perhaps it is the desire to keep
fire prevention education fun and exciting that deters the American fire service from testing
before or after lesson delivery. Whatever the reason, it needs to be weighed against the possible
benefits for the children and community the fire service has sworn to serve.

No matter what resources an agency possesses, there are steps they can take to reduce the
risk to the public. It can be as simple as asking a few questions before and after a fire prevention
lesson is given. Somehow, it needs to be reinforced that it is possible to measure fire prevention
activities, have fun and deliver an important message. The initial step will lie in the education of
fire service personnel. Numerous agencies around the country have realized the benefits in fire
prevention education testing at the elementary school level. Other departments have yet to make
it a common practice of the organization.
After looking at the extensive thought that has been given to the value of testing, and if the results of the fire agency survey reflect the national picture, it is surprising that the fire service has not embraced the idea of it for fire prevention. The fire service needs to recognize the importance of testing as a component for improvement. Dr. Barbara Terry (2007) asserts that educators need to know that the process of testing cannot be an option if improvements are to be made.

Organizational Implications

One of the greatest implications of this research is that the members of MFD likely could improve fire prevention education at the elementary school level if it were measured. It brings to light discussion about other areas of fire prevention activities that could also be measured helping to justify fire prevention activities to all stakeholders involved. The traditional beliefs surrounding this topic are deeply engrained and may not be easy to change. On the plus side, MFD’s awareness of positive community relations led to the PIO/Educator position and to the current rotation among firefighters to teach fire safety to children in K-2.

Dr. G. Reid Lyon (2002) at the National Institutes of Health reported that testing children, especially those with learning disabilities, does not guarantee positive behavioral changes, adding that many other factors need to be addressed as well. Furthermore, the ongoing process of repetition may not be enough for those that face learning disabilities. A fire safety evaluation component would need to be vetted with MSD educators who focus on special needs children.

This research project proved to the author that strong partnerships with public educators need to exist before fire prevention activities take place, and need continuing dialog to keep both organizations’ objectives aligned with each other. Can that be effectively accomplished in the current, sometimes overloaded schedule of MFD and MSD? MFD needs improved
understanding of NCLB’s impact on MSD’s curricula and faculty for K-2 in an effort to fold fire safety lessons into the NCLB requirements, which would benefit all the stakeholders.

In the case of this research, it is not a question of can fire safety evaluation be done but rather how soon can we develop it. Regardless, virtually all studies that this author examined showed that testing was vitally important in any learning process. It should also be noted that the Chief of MFD, Greg Corn, fully supports the idea of pretesting and posttesting for fire prevention education (personal communication, July 18, 2007).

MFD may not see the beneficial results of this process unless statistical data is properly collected and monitored. This means that the process would need to begin with the education and follow up of fire safety and school educators to ensure success. As stated by FEMA (2002), with strong individual and organizational commitment to public education initiative, organizations can make a tremendous difference in the community.

Recommendations

As a result of the data collected for this applied research paper, the best recommendations that this author can offer are to:

1. Apply the proven criteria set forth by education professionals to measure the effectiveness of MFD’s fire prevention education for MSD K-2. Further research will be necessary to determine copyright permissions, comparative costs, benefits, and class time required for using components from programs such as *play safe! be safe!, Risk Watch Safe Community*, or *Safe Kids Worldwide*.

2. Work cooperatively with MSD to develop and implement a pretest and posttest to assess student understanding of the fire prevention lessons. This would require setting a timeline and agreed objectives for piloting the tests.
3. Concurrently initiate a dialog with MSD to explore ways the MFD fire safety training could satisfy MSD curriculum/NCLB requirements for K-2. Optionally, find timesaving opportunities to combine fire safety lessons with scheduled school fire drills.

4. Work with the MFD PIO to develop a brief train-the-trainer module for MFD staff to ensure consistency in delivering the fire prevention program.

5. Publish the pilot program’s results for MSD and MFD reference for planning a standardized program that could be a county, state, or national model for fire departments and school districts.

6. Continue to monitor and adjust lessons based on findings from the pilot testing program.

7. Create a fact sheet about MFD’s fire prevention education program to distribute through MSD during Fire Prevention Month, and post it on both MSD and MFD Web sites.

8. Continue related research into the relationship between fire prevention education in primary grades and fire setter behavior.

9. Expand the current research base by redesigning the survey instrument to invite input from burn foundations, state fire associations, and state education associations.

This author feels that these recommendations are the best blueprint for building a credible and practical instrument to measure fire safety education because they:

1. Jointly engage experienced fire and education professionals who know fire and classroom realities, and who agree on learning objectives.

2. Invite continuous quality assurance, allowing both school and fire agency to improve the effectiveness of fire prevention education based on evidence.

3. Strengthen an existing partnership through mutual exploration of tactics that support NCLB strategy to improve student performance and core competencies.
A final recommendation to the readers of this applied research paper is to consider the findings in light of their own organization’s program needs for fire prevention education in achieving the overarching mission of fire service--to save life and to prevent injury in the communities we serve.
References


Appendix A

Teacher Questionnaire

Measuring the Effectiveness of Fire Safety Classes for K-2 Students

1. Do you think that fire prevention education has instructional value in grades K-2?
   _____Yes  _____No

2. What type of evaluation method do you think would effectively measure a student’s learning in fire prevention classes?
   _____True/false  _____Yes/no  _____Multiple-choice
   _____Matching  _____Fill in the blank  _____Question and answer discussion
   _____Other (please specify)

3. When do you think an evaluation instrument should be administered?
   _____Before instruction  _____After instruction  _____Before and after instruction

4. Do you think an evaluation tool is necessary to ensure learning and positive behavior changes in fire prevention training?
   _____Yes  _____No

5. Who do you think should administer the evaluation instrument?
   _____Classroom teacher  _____Fire department representative

Thank you for your help!
Appendix B

Fire Department Questionnaire

Measuring the Effectiveness of Fire Safety Classes for K-2 Students

1. Does your organization provide fire prevention education to children in grades K-2?
   _____Yes   _____No

2. Does your organization have a process in place to evaluate the effectiveness of the fire prevention program?
   _____Yes   _____No

3. In your opinion, has your fire prevention program been well received by teachers?
   _____Yes   _____No

4. What kind of evaluation instrument does your organization use to measure fire prevention behavior changes in children? Check all that apply.
   _____True/false   _____Yes/no   _____Multiple choice   _____Matching
   _____Short answer   _____Fill-in the blank   _____Question and answer discussion
   _____Other (please specify) ____________________________________________________

5. When do you administer the evaluation instrument?
   _____Pretest   _____Posttest   _____Pretest and posttest

6. How does your organization use the data collected from the evaluations? Check all that apply.
   _____Provides evidence that learning occurred
   _____Provides evidence that positive behavior changes occurred
   _____Provides feedback used to adjust instructional approach
   _____Provides measurement for organizational effectiveness
   _____Provides justification to schools regarding fire prevention delivery
   _____Provides justification to organization regarding fire prevention
   _____All of the above
   _____None of the above

Thank you for your help!
Appendix C

Teacher Questionnaire Results

Table C1

*Fire Prevention Education Has Instructional Value in Elementary Schools (K-2)*

<table>
<thead>
<tr>
<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>98.4%</td>
<td>63</td>
</tr>
<tr>
<td>No</td>
<td>1.5%</td>
<td>1</td>
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</table>

Table C2

*Type of Evaluation Method That Would Effectively Measure Student Learning in Fire Prevention*

<table>
<thead>
<tr>
<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
</tr>
</thead>
<tbody>
<tr>
<td>True/false tests</td>
<td>18.7%</td>
<td>12</td>
</tr>
<tr>
<td>Yes/no tests</td>
<td>29.6%</td>
<td>19</td>
</tr>
<tr>
<td>Multiple-choice tests</td>
<td>9.3%</td>
<td>6</td>
</tr>
<tr>
<td>Matching test</td>
<td>39%</td>
<td>25</td>
</tr>
<tr>
<td>Fill in the blank</td>
<td>12.5%</td>
<td>8</td>
</tr>
<tr>
<td>Question/answer</td>
<td>53.1%</td>
<td>34</td>
</tr>
<tr>
<td>Other*</td>
<td>15.6%</td>
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</table>

*Note. Other included demonstrations, pictures, homework project

Table C3

*When an Evaluation Instrument Should Be Administered*

<table>
<thead>
<tr>
<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
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<td>Post-test</td>
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</tr>
<tr>
<td>Pre/Post test</td>
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<td>38</td>
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Table C4

*An Evaluation Tool Is Necessary to Ensure Learning and Positive Behavior Changes in Fire Prevention*

<table>
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<tr>
<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
</tr>
</thead>
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<tr>
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<td>32.8%</td>
<td>21</td>
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<tr>
<td>No</td>
<td>64%</td>
<td>41</td>
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Table C5

*Who Should Administer the Evaluation Instrument*

<table>
<thead>
<tr>
<th>Choice</th>
<th>Response %</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Classroom teacher</td>
<td>59.3%</td>
<td>38</td>
</tr>
<tr>
<td>Fire representative</td>
<td>51.5%</td>
<td>33</td>
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</tbody>
</table>
Appendix D

Fire Department Questionnaire Results

Table D1

*Your Organization Provides Fire Prevention Education to Children in Grades K-2*

<table>
<thead>
<tr>
<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>94.7%</td>
<td>18</td>
</tr>
<tr>
<td>No</td>
<td>5.2%</td>
<td>1</td>
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</table>

Table D2

*Your Organization Has a Process to Evaluate the Effectiveness of the K-2 Fire Prevention Programs*

<table>
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<th>Response %</th>
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<td>42.1%</td>
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</tr>
<tr>
<td>No</td>
<td>57.8%</td>
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Table D3

*Your Fire Prevention Program Has Been Well-received by Teachers*

<table>
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<th>Response %</th>
<th>Response total</th>
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<td>18</td>
</tr>
<tr>
<td>No</td>
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</tbody>
</table>

Table D4

*Instrument Your Organization Uses to Measure Fire Prevention Behavior Changes in Children*

<table>
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<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
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</thead>
<tbody>
<tr>
<td>True/false tests</td>
<td>10.5%</td>
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</tr>
<tr>
<td>Yes/no tests</td>
<td>21%</td>
<td>4</td>
</tr>
<tr>
<td>Multiple-choice tests</td>
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<td>3</td>
</tr>
<tr>
<td>Matching test</td>
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<tr>
<td>Short answers</td>
<td>1%</td>
<td>2</td>
</tr>
<tr>
<td>Fill in the blank</td>
<td>.5%</td>
<td>1</td>
</tr>
<tr>
<td>Question/answer</td>
<td>57.8%</td>
<td>11</td>
</tr>
<tr>
<td>Other*</td>
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<td>4</td>
</tr>
</tbody>
</table>

*Note. Other* included demonstrations, homework, rating scales
### Table D5

*When You Administer the Evaluation Instrument*

<table>
<thead>
<tr>
<th>Choice</th>
<th>Response %</th>
<th>Response total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.5%</td>
<td>1</td>
</tr>
<tr>
<td>Posttest</td>
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<td>8</td>
</tr>
<tr>
<td>Pretest and Posttest</td>
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</table>

### Table D6

*How Your Organization Uses the Data Collected from the Evaluations*

<table>
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<th>Choice</th>
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<th>Response total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides evidence that learning occurred</td>
<td>26.3%</td>
<td>5</td>
</tr>
<tr>
<td>Provides evidence that positive behavior changes</td>
<td>1%</td>
<td>2</td>
</tr>
<tr>
<td>Provides feedback used to adjust instructional</td>
<td>26.3%</td>
<td>5</td>
</tr>
<tr>
<td>Provides measurement for organizational</td>
<td>21%</td>
<td>4</td>
</tr>
<tr>
<td>Provides justification to schools regarding fire</td>
<td>15.7%</td>
<td>3</td>
</tr>
<tr>
<td>Provides justification to organization regarding</td>
<td>21%</td>
<td>4</td>
</tr>
<tr>
<td>All of the above</td>
<td>21%</td>
<td>4</td>
</tr>
<tr>
<td>None of the above</td>
<td>15.7%</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix E

List of Marysville School District Schools Given Questionnaire

Allen Creek Elementary  Pinewood Elementary
Cascade Elementary     Quil Ceda Elementary
Kellogg Marsh Elementary Shoultes Elementary
Liberty Elementary     Sunnyside Elementary
Marshall Elementary    Tulalip Elementary
Appendix F

List of Fire Departments Given Questionnaire

<table>
<thead>
<tr>
<th>Mobile, AL</th>
<th>Fayetteville, NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesa, AZ</td>
<td>Jacksonville, NC</td>
</tr>
<tr>
<td>Scottsdale, AZ</td>
<td>Rocky Mount, NC</td>
</tr>
<tr>
<td>Laguna Beach, CA</td>
<td>Miamisburg, OH</td>
</tr>
<tr>
<td>Calgary, Alberta, Canada</td>
<td>Eugene, OR</td>
</tr>
<tr>
<td>Fort Lupton, CO</td>
<td>Portland, OR</td>
</tr>
<tr>
<td>Miami Township, FL</td>
<td>Hilton Head Island, SC</td>
</tr>
<tr>
<td>Orange County, FL</td>
<td>Greenville, TN</td>
</tr>
<tr>
<td>St. Petersburg, FL</td>
<td>Johnson City, TN</td>
</tr>
<tr>
<td>Honolulu, HI</td>
<td>Flower Mound, TX</td>
</tr>
<tr>
<td>Glenview, IL</td>
<td>Frisco, TX</td>
</tr>
<tr>
<td>West Des Moines, IA</td>
<td>Midland, TX</td>
</tr>
<tr>
<td>Lawrence, KS</td>
<td>Springfield, VT</td>
</tr>
<tr>
<td>Lenexa, KS</td>
<td>Prince William County, VA</td>
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<tr>
<td>Mendon, ME</td>
<td>Virginia Beach, VA</td>
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<td>Clark County, WA</td>
</tr>
<tr>
<td>Springfield, MO</td>
<td>Kent, WA</td>
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<td>Longview, Washington</td>
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<tr>
<td>Derry, NH</td>
<td>Madison, WI</td>
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<tr>
<td>New York, NY</td>
<td>Casper, WY</td>
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</tbody>
</table>