

Running head: AN EVALUATION OF THE EFFECTIVENESS OF THE AMARILLO

An Evaluation of the Effectiveness of the Amarillo Fire Department's Fire Safety House Program

Greg Mayes

Amarillo Fire Department

Amarillo, Texas

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 have used the language, ideas, expressions, or writings of another.

Signed: \_\_\_\_\_

### Abstract

The Amarillo Fire Department (AFD) delivers the Fire Safety House Program (FSHP) to all students in the third grade in our city. The AFD did not know if the FSHP was effective in educating students in the Amarillo area about fire safety and prevention. The purpose of this study was to determine if the Program had been effective in educating these students. The learning objectives of the FSHP were defined and methods to evaluate the effectiveness of educational programs were identified. Evaluative research was used to identify and compare students' knowledge about fire safety and prevention before and immediately after participation in the FSHP. Knowledge of participants in the FSHP the previous year was compared to the knowledge exhibited by current Program students. The study also compared the home behaviors of the families of participants in the FSHP in regards to fire safety and prevention with the behaviors of the general public. The procedures included literature review, interviews, observations, pre- and post-testing of participants, and a home survey. The results indicated the FSHP had been effective in increasing students' knowledge about fire safety and prevention, but had not resulted in positive behavior changes in the home. As a result of the study, recommendations included the development of a formal lesson plan for the FSHP, periodic testing of participants at the conclusion of the Program, presenting a booster program to fourth grade students, and to develop more accurate records of the activities and results of the FSHP.

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## An Evaluation of the Effectiveness of the Amarillo Fire Department's Fire Safety House Program

### Introduction

In 1973, The National Commission on Fire Prevention and Control (NCFPC) released a report entitled *America Burning* (National Commission on Fire Prevention and Control [NCFPC], 1973). This report was the first to look at the issue of preventable fires on a national level. The commission estimated the number of injuries and deaths as well as property losses suffered by the people of the United States. The causes and contributing factors surrounding preventable fires were also examined. From this research, the NCFPC made several recommendations to reduce the occurrence and severity of preventable fires (1973, pp. X, XI). Among these recommendations was that fire departments expend more effort to educate school children on fire safety. The Commission also recommended that fire departments educate adults through residential inspections and the enforcement of fire prevention codes. A key recommendation was the creation of the United States Fire Administration (USFA) to address the nation's fire problem in its entirety.

The Fire Marshal's Office (FMO) of the City of Amarillo purchased a fire safety trailer in 1993. A fire safety trailer is a towed travel trailer that has been scaled down to represent a kid sized functional home (Texas Department of Insurance, 2008). A Fire Safety House Program (FSHP) was developed, and the Fire Marshal began delivering the program to second grade students in Amarillo. The stated goal of the program was to educate children on fire safety and fire prevention.

Before 1997 the FMO operated as separate city department reporting directly to the city manager of Amarillo. In 1997 the FMO was placed under the control of the fire chief of the Amarillo Fire Department (AFD). The FSHP was expanded and the staff of the FMO was

increased to assist with the FSHP and other duties. The position of Public Information Officer (PIO) was established and responsibility for delivery of the FSHP was placed with this individual. The problem is the AFD does not know if the FSHP is effective in educating students about fire safety and fire prevention strategies.

The purpose of this study is to determine the effectiveness of the AFD's FSHP in educating Amarillo's school children in fire safety and fire prevention strategies. Evaluative research will be used to analyze the data collected and provide answers to the following five questions. What are the learning objectives of the FSHP? What methods can be used to evaluate the effectiveness of educational programs? How does students' knowledge about fire safety and fire prevention strategies before participation in the FSHP compare with their knowledge after participation in the Program? How does students' knowledge about fire safety and fire prevention strategies the year after participation in the FSHP compare with students' knowledge immediately after the presentation of the Program? How do the fire safety and fire prevention behaviors of the families of students that have participated in the FSHP compare with the behaviors of the general public?

### Background and Significance

The City of Amarillo's FMO began delivering the FSHP to second graders in the Amarillo Independent School District (AISD) in 1993. The AFD Fire Marshal stated the program was fashioned after the FSHP presented by the Texas Fire Marshal's Office (T. McKinney, personal communication September 5, 2008). The program was made available to all interested AISD schools upon request. The City of Amarillo did not add any staff to support this new program. Responsibility for delivery of the FSHP was simply added to the other duties of the Fire Marshal. The FMO was understaffed at the time and, consequently, had great difficulty in

delivering the FSHP to the few schools that requested it. In 1995 the FMO partnered with the Junior League, a civic organization, to present the FSHP. Their goal was to deliver the FSHP to all third graders in the AISD. It had been determined by those involved with the program that the material was too advanced for second graders. In 1997, the FMO became the Fire Prevention Division under the fire chief of the AFD. Staff was added, the position of PIO was created and on-duty engine companies were made available to assist with the delivery of the FSHP.

With an increased staff, the PIO lobbied the AISD, the Canyon Independent School District (CISD), and nine private schools to make a commitment to allow the FSHP to be presented to all third graders during a school year. The AFD and the Junior League worked together to deliver the FSHP until 2004. At that time the Junior League pulled out of the program due to falling membership within their organization. When this occurred, the AFD authorized the PIO to utilize off-duty firefighters to assist with delivery of the program. The off-duty firefighters are paid at one and one half times their hourly salary, and the work is scheduled by the PIO. The program is presented to two schools per week throughout the school year.

Currently the AFD delivers the FSHP to the third grade students at the 35 elementary schools in the AISD as well as 4 elementary schools in the CISD. Two of the schools are within the city limits and two are in the surrounding county. Generally, the nine private schools participate in the program, but that number varies from year to year. The AISD estimates there are 2,000 third graders in their schools (Amarillo Independent School District, 2008). Approximately 400 more third grade students attend the CISD schools and the private schools. The PIO documents any third grade class that does not receive the FSHP, and every effort is made to deliver the program to them as fourth graders the following year.



The FSHP has undergone some modifications since its inception. The program is currently presented to the students by the PIO, two off-duty firefighters, and an on-duty four-person engine company. This is a sharp contrast to the original program delivered by only the fire marshal.

The AFD has made one notable change from the model presented by the Texas State Fire Marshal's Office. Before, children were taught to crawl under smoke and out a door in the event of a house fire. On February 3, 1999, a fourth-grader who participated in the FSHP the previous year lost his life during a fire in his home (Amarillo Fire Department [AFD], 1999). The fire had originated in the kitchen and spread to the family room. The boy was asleep in his bedroom when the fire began. Family members who escaped the fire called frantically for him from outside the front door.

The investigation revealed the young boy, responding as instructed during the FSHP, tried to crawl under the smoke from his bedroom to the front door. His body was discovered in the family room. Compounding this tragedy was the fact that his bedroom received considerably less fire damage than the rest of the structure. The investigation further revealed that the cause of death was thermal injuries, not smoke inhalation. Because of this event, those delivering the FSHP began informing students to crawl away from smoke to a door or window that leads to the outside instead of crawling under smoke.

The FSHP is not the only program administered by the AFD in an effort to educate both students and adults about fire safety and fire prevention. The Fire Prevention Division delivers the *Sparky the Fire Dog* program, upon request, to pre-k through second grade classes in the elementary schools. The National Fire Protection Association's (NFPA) *Risk Watch* program has been instituted in four elementary schools in Amarillo. The Fire Prevention Division staff and

the PIO also deliver, upon request, fire safety and fire prevention speeches to several civic groups, churches, industry workers and other interested groups throughout the course of a year.

The AFD budgeted \$636,760 for salaries, wages, and benefits for the eight full-time employees in the Fire Prevention Division for 2007 (City of Amarillo [COA], 2007, p. 138). Included in this amount are the costs for the administration and delivery of fire safety and fire prevention programs. The FSHP is the only safety and prevention program that is vigorously promoted and receives the largest portion of the budget dedicated to public education. The FSHP is delivered to approximately 2,400 third graders every year. In addition to administration costs, a large portion of the PIO's time is consumed by the FSHP. Fire companies are out-of-service for four hours every day that the FSHP is being presented at a time when there are more and more demands on their schedule. For the year 2007, the AFD Fire Chief stated \$25,000 was budgeted to pay for the overtime costs of presenting the FSHP (S.D. Ross, personal communication, November 17, 2008). Sharpening the focus on the cost of the FSHP is the fact that the AFD budget has not been increased in any areas except payroll for three consecutive budget cycles. Monies may be shifted within the department, but expenditures for new programs or enhancement of current programs has not been funded. Viewing the current economic outlook and the fact that 22 % of the City of Amarillo's budget is derived from sales tax (COA, p. 3), the AFD does not expect increases in program funding in the near future.

Although the FSHP has been presented in Amarillo for 15 years, the AFD has not analyzed the program to see if it has been effective in educating school age children in the Amarillo area. The AFD is committed to educating school children in fire safety and fire prevention strategies and has dedicated a great deal of resources to the FSHP. If the program has been successful in educating students, this should be documented. If the program has only been

partially successful or ineffective, the reasons should be identified and corrected. Without review or documentation, the AFD may not be able to justify maintaining funding for the FSHP at its current level, much less approach city management with a request for an increase.

One of the key concepts of the National Fire Academy's *Strategies for Community Risk Reduction* course is utilizing fire and life safety education in any effective community risk-reduction strategy (U.S. Fire Administration [USFA], n.d., p. 7). This project will examine a portion of the public education efforts by the AFD and evaluate the effectiveness of that program.

This project relates to the USFA's first tactical objective of reducing mortality from fire by 15% (USFA, n.d., p. 5). Preventing an event from occurring is the most effective way to reduce the impact of preventable fire from affecting our citizens. Fewer fires result in less risk for the public, less risk to fire fighters, and should result in a lower mortality rate.

#### Literature Review

The landmark report *America Burning* (NCFPC, 1973, pp. X, XI) reported the deplorable condition of fire prevention and fire loss occurring in the United States. The report noted the lack of education for the public in fire prevention and the immense differences in the training firefighters received from one jurisdiction to the next. The NCFPC held that the most destructive fires were caused by the careless actions of people, either due to a lack of knowledge or a lack of awareness. They estimated that 72.8% of all fires could be attributed to human actions (p. 106). The public's inability to recognize fire hazards in their environment, whether damaged or worn equipment or unsafe conditions, underscored the need for focused education for the general public.

The NCFCP believed education, training, and engineering improvements that made products and our environment safer were the best strategies to reduce the impact of fires on American citizens. By enacting each of these strategies, the Commission hoped to reduce fire losses by five percent each year until the nation's losses had been halved in approximately 14 years.

The NCFCP (1973) estimated 12,000 people died and 300,000 were injured annually in structure fires. Total fire loss, including cost of fire department response, injury treatment, insurance claims, and lost productivity was estimated at 11.4 billion dollars. The United States reported 57.1 deaths-per-million-population in 1973. This rate was the highest among industrialized countries. Canada was second with a 29.7 deaths-per-million-population. The NCFPC also reported, only five percent of fire department budgets were earmarked for prevention and education activities.

Among the many NCFPC (1973) strategies and recommendations were: (a) continuation and expansion of current educational programs being utilized in some jurisdictions; (b) the wide spread use of fire detectors; and (c) the installation of sprinkler systems in all dwellings that people regularly occupy, including homes. They also recommended promotion of Exit Drills in the Home (EDITH), a program that calls for practiced exit drills in the home (ch. 15).

Phillips (1973), a member of the NCFPC, wrote a minority report disagreeing with many of the recommendations of the report. It was her belief that monies directed to the proposed USFA and a National Fire Academy would be much better spent in a massive public education program. She believed without educating both adults and children in fire prevention and fire safety, the annual toll taken by fire on people could not be substantially reduced (p. 156).

Twenty-eight years after the publication of *America Burning*, (NCFPC, 1973) a second report, *America at Risk: America Burning Re commissioned* (USFA, 2002) was authorized. A newly formed NCFPC studied the original report and examined the progress made on the original goals and recommendations. This Commission condemned the lack of federal funding for many of the recommendations in the original report. Their report stated that proven strategies to reduce the incidence of fire and reduce fire loss had been identified but could not be fully implemented without proper funding. The commission acknowledged that deaths from fire had dropped from approximately 12,000 in 1973 to 4,035 in 1998, but they believed this number could have been far lower.

In 2007 there were an estimated 3,430 civilian deaths and nearly 18,000 civilian injuries due to fire (Karter, 2008, p. 5). From 1999 to 2007, the number of yearly structure fires has remained relatively constant (p. 8). The United States experienced an 11.4 deaths-per-million population rate (p. 24) a five-fold decrease since 1973.

The City of Amarillo has experienced an increase in injuries and deaths from fire during the last five years. The Fire Prevention Division began publishing fire investigation statistics in 2003. The number of deaths from fire has gone from two in 2003 to seven in 2007. The number of injuries from fire has increased from 33 to 41 in the same respective years (AFD, 2008, p. 75).

There are an estimated 250,000 children that seek medical treatment for burns each year (Children's Burn Foundation [CBF], 2008b). It is estimated that more than 80% of these injuries are preventable, with children younger than the age of five being the most vulnerable.

Approximately 1,100 children die from fire and burn injuries each year. According to a survey conducted by Harris Interactive, approximately 96% of all homes have a smoke alarm (National Fire Protection Administration [NFPA], 2004) and two-thirds of the households have an escape

plan in the event of a fire. However, of those with an escape plan, only 23% have actually practiced it. Of the people surveyed, only eight percent reported their first thought when hearing a smoke alarm would be to get out.

Documenting the effectiveness of a fire prevention program has proven extremely difficult (Crawford, 2005; McLoughlin, 1982). It is impossible to count incidents that did not happen. Consequently, estimates must be made for the number of expected events based on historical data. This number can then be compared to the number of events that actually occurred. Calculations of expected events for fire prevention programs are very complex due to the fact that burns, when viewed in relation to the general population, are extremely rare events. In order to provide a stable estimate for comparison, a large population group is required. Delivering a program to a substantial number of people demands a large program and a correlating large budget (McLoughlin, 1982).

Difficulties associated with such a large project can be seen in a prevention program in Boston (MacKay & Rothman, 1982). A burn prevention program was initiated in three of four communities in the Boston area for a period of eight months. The program was education based. In one community education was provided to school-aged children only; it was presented as a public education program thru the media in a second community. The program was delivered in both manners in the third community, and the fourth community was used as a control group.

MacKay and Rothman (1982) studied the incidence of burn injuries for the four years prior the implementation of the program, during the eight months of active implementation, and during the three years after the program. Pre- and post-program testing of students, surveys and observations from classrooms and public meetings were also evaluated. MacKay and Rothman found no evidence that the program delivered to only school-age children had any effect on burn

injuries. Similarly, the community that received only public education thru media sources did not reduce their number of burn injuries. The only group that showed a reduction in burn injuries was the third community in which both school-aged children and the general public were educated. Unfortunately, the gains seen in this community were short-lived. Three years after completion of the program, the rate-of-incidence of burn injuries in all of the communities studied had slightly surpassed pre-program rates-of-incidence. MacKay and Rothman concluded that education might possibly yield positive results in reducing the number of burn injuries, but that it would require a much larger financial commitment and greater effort than exerted in the Boston area program.

In reviewing the results of the Boston area program, McLoughlin (1982) took the position that school programs were at least partially successful based on an increase of knowledge seen in school-aged children. She states possible problems with the testing methods could explain the apparent lack of increased knowledge in the adult populations of the communities.

McLoughlin (1982) also cites a similar program in England where a television publicity campaign was designed to reduce grease fires in kitchens. Pre- and post-intervention comparisons were made of the number of fires and the number of injuries experienced. A market research survey was also utilized to measure public knowledge. The study showed an original 30% reduction in the number of fires, but six months after the campaign the rate-of-incidence of fires increased to near pre-program levels. A booster program was instituted and the rate-of-incidence of fires quickly fell back to similar rates experienced during the program.

The Government Accounting Standards Board (2008) has developed an alternative method of evaluating the operational efficiency of government services. A Service, Efforts, and Accomplishment (SEA) report allows local governments to quantify efforts and outcomes in a

consistent fashion. The measured criteria for a SEA report are: (a) input, such as resources dedicated; (b) outputs, the accomplishments of the resources; (c) outcomes, or the observed changes from the efforts; and (d) efficiency, or the ratio of cost per unit of service.

Anecdotal evidence of a program's success is generally the most powerful form of validation (Crawford, 2005). A well-publicized report of lives saved as a result of information learned from a prevention program can be very effective in a community. However, the SEA report can be used to defend a fire prevention program in times of budgetary constraint. Lacking anecdotal evidence, a SEA report can document a variety of fire prevention activities. Pre- and post-test scores of presentations reveal a cognitive gain in knowledge. The number of inspections completed by inspectors can be formatted to show efficiency. Using surveys, it is also possible to document the number of times people perform escape plans or check their smoke alarms.

Crawford (2005) states measuring loss reduction is the most effective way to gauge the effectiveness of a prevention program, but this must be done by looking at trends over a number of years and should include variables, such as a changing population. This method is how the Portland Fire Bureau illustrates the success of their Youth Education Program (Porth, 1999). By tracking the number of fires started by juveniles from 1992 to 1997, the Portland Fire Bureau was able to show a 36% reduction of those fires over that timeframe.

The number of fires in the United States has decreased dramatically in the last 25 years (Byrne, 2008a, p. 46). The number of overall fires has dropped from 3.2 million in 1977 to just over 1.6 million in 2006. The number of fire related deaths has also decreased by more than 50% during the same time period. Both of these outcomes were original goals stated in the NCFPC's *America Burning* (1973). However, the overall number of fires in residential structures has increased since 1999 (Byrne, 2008a). Reductions in fire losses have been in primarily in non-



residential structures where code enforcement and more rigid building standards have been successfully utilized.

Byrne (2008a) believes true fire prevention education should be brought to every citizen. The lessons taught in elementary schools are actually fire survival strategies, not prevention strategies. Parents must be involved if fire prevention goals are to be met, and the information taught to elementary students must be evaluated to determine if true learning has taken place. For true teaching to have taken place, we must be able to assess learning outcomes (Fleming, 2000). Focus for educational programs should be on evaluation of learning, not on course development and delivery. The ability to demonstrate successful learning outcomes is vital in respect to continued funding (p. 20).

Byrne advocates teaching fire prevention strategies as well as fire survival techniques to elementary school students (Byrne, 2008b). One of the goals advocated by Byrne is a 90% retention rate of the information being presented. To assist in this goal, the material is presented, and the students then demonstrate the appropriate actions that should be carried out in the event of a fire. A fire safety house is used to help students relate the verbal instructions to the physical actions necessary to prevent or survive a fire in the home.

It is Byrne's position (Byrne, 2008c) that most of the education performed for elementary age students is fire survival techniques. Middle school and high school education is the age that true fire prevention strategies can be mastered. He believes the most effective way to evaluate a program is to talk to former students and discover what they remember the most about fire safety. In this manner it is possible to evaluate if the key learning objectives are being met.

Mobile Concepts by Scotty (n.d.) was the first company to commercially manufacture a fire safety house trailer in 1990. Prior to 1990, several individual fire departments had built

similar products for use within their own jurisdiction. Currently, some departments partner with industries or foundations to deliver a FSHP. The Burbank, Glendale, and Pasadena Fire Departments partner with the Children's Burn Foundation (CBF) (CBF, 2008a). In their program, third grade students are taught fire survival and fire prevention strategies. Students are taught about kitchen dangers, such as turning the handles of pans used for cooking in toward the center of a stove. They also learn to crawl under smoke to escape a fire in the home. The fire safety house trailer allows the students an opportunity to practice these skills in a realistic setting. Once escaping from the trailer, the students call 911 on a phone located outside of the trailer to report the fire. The City of New Orleans Fire Department (NOFD) operates a similar program in conjunction with the Carrollton Rotary Club (New Orleans Fire Department, [NOFD], 2008). The NOFD uses the fire safety house to educate both adults and children in burn prevention and fire escape techniques through hands on methods.

The NOFD (2008) states their FSHP was designed to help prevent fires and to teach children how to escape a fire, but they do not identify the individual learning objectives of a fire safety house. The responsibility for educating the public in fire prevention belongs to the fire service (McLoughlin, 1982; NCFPC, 1973). The *Oxford American Dictionary* (Ehrlich, Flexner, Carruth, and Hawkins, 1980, p. 274) defines *education* as "systematic training and instruction designed to impart knowledge and develop skill". *Education* can also be defined as gaining knowledge, skills, and development (Merriam-Webster's Student Dictionary, n.d.). Educators do not agree on a common definition of education (Teacher's Mind Resources, n.d.). Their definition is based on experiences and values that are individual to them. Further confusing the issue of education is the distinction between the purpose of education versus the function of education. The purpose of education is the transfer of information to a student; where as the

function of education is to create a change in the behavior of a student. If a change in behavior is the goal of education, some form of assessment must be used to determine the effectiveness of the education.

The traditional thinking of educators was that once a student acquired the knowledge of an issue, attitudes, and actions would change in a positive fashion (Hungerford & Volk, 1990). Hungerford and Volk disagree with this traditional thinking and state that student behaviors depend on a much wider range of variables. Student behavior changes when: (a) the information is presented, (b) the student understands the nature of the issue, and (c) the issue is personal to them. Students must also feel that they have the ability or power to make positive changes before any significant changes in behavior will occur. It is at this point that true learning has taken place. Simply presenting material without some form of assessment will not reveal if effective teaching has taken place (Fleming, 2000). Assessments should be student-centered, teacher-directed, and mutually beneficial to both parties.

One method of assessing the effectiveness of education is by utilizing standardized tests (Duke & Ritchhart, 1997). These types of tests are a mainstay in most school districts because they provide information that can be used to compare students, classes, or schools. Standardized tests provide a systematic procedure for describing behaviors and a specified method for administration and scoring (Goodwin & Driscoll, 1980, p. 59-60). They establish format, present the same tasks, and require the same response modes of all test takers. Goodwin and Driscoll (p. 60) go on to warn that to be reliable, standardized test must be written to coincide with the specific objectives of the educator. Standardized tests developed for a broad array of institutions will not give as reliable results as test developed for a smaller population.

Several educators and teachers are critical of standardized testing. Educators and teachers caution that the results of standardized tests should only be a portion of the overall assessment of student's performance (North Central Regional Educational Laboratory [NCREL], 1997, p.1). Poor results on a single test should not be a basis for making educational or curriculum changes. A major concern when using standardized tests is the language used (National Capital Language Resource Center [NCLRC], 2004). If the language used in the questions is not keyed to the student's level of reading proficiency, the test will not accurately evaluate student performance. Another fallacy of standardized tests is the tendency of educators to focus on test results during instruction instead of changing student behavior or assuring true learning has taken place (NCREL, 1997). Though educators agree that equity in testing is paramount to evaluation, some educators hold the belief that the culture the students live in and their perception of the world around them makes standardized tests basically unfair.

In spite of the dissatisfaction with standardized tests, educators continue to rely on them for a variety of reasons. Very few teachers or educators have been trained to assess student learning outside of the standardized test (Stiggins, 2002). To be effective, classroom assessment or evaluation of learning must be continual and educators must make day-to-day instructional decisions based on the students' needs. Time constraints in conjunction with a lack of training and support for educators in classroom assessment result in a reliance of standardized test results to drive educational programs.

A *value-added assessment* is an assessment to measure an increase in knowledge after participation in a program (Skidmore College, n.d.). Pre- and post-testing is the most common form of value-added assessments. Pre- and post-testing can be easily scored, the data can be readily analyzed, and these are especially helpful in measuring student knowledge. The McKay

Foundation (2008) recommends using pre-tests, post-tests and surveys to evaluate the success of a prevention program's design. The tests measure the students' change in knowledge and the surveys can be used to assess behaviors exhibited outside the classroom (Bassler, Brasier, Fogle, & Taverno, 2008, p. 9). Post-tests may be even more effective when given weeks or months after the completion of a program (Steinkuehler & Derry, 2001). This delay enables the educator to assess the long-term benefits of a program and make any necessary adjustments to the curriculum.

### *Literature Review Summary*

The literature review provided an excellent historical view of fire prevention goals and documented both successes and failures. Three major objectives of fire prevention, safer products, code enforcement, and education were identified (NCFPC, 1973). Product engineering and code enforcement have been shown to be effective in reducing preventable fires (USFA, 2002). However, the behaviors of people, whether they are uninformed or unaware, continue to be problematic in fire prevention. The increase in the number of residential structure fires (Byrne, 2008a) indicates public education has not been effective. This influenced the project by focusing attention on the effectiveness of the education delivered by the FSHP.

The literature review identified both acquired knowledge and changes in behavior as indicators of effective education or learning (Hungerford & Volk, 1990). Changes in knowledge do not necessarily indicate a change in behavior. To be successful, an educational program must increase knowledge and have a positive change on student behavior. This influenced the project by forcing the evaluation of the education delivered by the FSHP to go beyond the testing of student knowledge. Changes in student behavior also should be evaluated.

Problems and difficulties in evaluating the effectiveness of education were identified in the literature review. Though many educators are critical of standardized tests, they remain as one of the easiest methods to measure an increase in knowledge (Goodwin & Driscoll, 1980, p. 59-60). Pre- and post-tests given to students to evaluate increases in knowledge must be based on the information presented during the program. The test had to be written in age-appropriate manner (NCLRC, 2004). Surveys were identified as the most practical method to document changes in behavior. This influenced the project in the development of the tests and surveys to be used.

### Procedures

The procedures used for this applied research project were literature review, observations, interviews, testing, and surveys. The evaluative research method was used to make comparisons between pre- and post-test scores and to compare behaviors identified in the surveys with behaviors identified in the literature review.

The initial procedural step was an interview with Captain Robert Johnson, the PIO of the AFD. The interview took place at the Fire Administration Building, located at 310 S. Van Buren, Amarillo, TX. The interview was conducted on August 26, 2008. Johnson was asked to identify the learning objectives of the FSHP and to identify any methods currently being used to evaluate the effectiveness of the current Program. Johnson was asked to produce any published documents concerning the FSHP. From this information, the stated learning objectives of the AFD's FSHP were identified.

The author attended the presentation of the FSHP at two schools, Rolling Hills Elementary and Forest Hill Elementary. The programs were delivered on September 24, 2008. Johnson, Fire Driver David LeGrand, and Firefighter Dave Alvarado served as lead instructors

during the Program. The key learning points stressed by the instructors during presentation of the FSHP were noted and then compared to the stated learning objectives of the FSHP. This information was used to answer the first research question.

The literature review began with a broad search of fire prevention goals and strategies. The history of fire prevention programs was examined and overall fire prevention goals and strategies were identified. Educational programs were researched with a focus on current FSHPs being used by other jurisdictions. Methods of evaluating effective education or learning were researched, and the difficulties and inequities during assessment of learning were identified. This information was used to assist in answering the second research question.

A seven-question pre- and post-test (Appendix A) was developed for third and fourth grade students. The questions were based on information presented during the FSHP and were written in a grade appropriate language. A cover letter (Appendix B) was written for the third grade teachers that explained the procedure to be followed in testing and the purpose of the research being conducted. A similar letter for fourth grade teachers was written (Appendix C). A home survey was also developed for fourth grade students to be completed by a parent or guardian (Appendix D).

Four schools were chosen to participate in the study. The schools were each located in a separate quadrant of the city and have a wide racial and economic diversity. None of the schools selected were involved in the *Risk Watch* program. The principal of each school was contacted and permission to have students participate in the study was granted. The letters, tests, and home surveys were delivered to each school during the week the FSHP was scheduled for delivery. Completed tests and surveys were picked up at the schools at the end of the following week. Results of the third grade pre- and post-tests and of the fourth grade test (Appendix E) were

recorded. Comparisons were made between the three test scores, and this information was used to answer the third and fourth research questions.

Results of the home survey were recorded (Appendix F), and comparisons were made between reported behaviors in the home and results from poll conducted by Harris Interactive for the NFPA (2004). This information assisted in answering the final research question.

One of the limitations of the surveys was the inability to assure that all students completed the tests under the same conditions. Without personally proctoring each test, responsibility for conformity in testing fell to a number of individual teachers. It is impossible to determine what, if any, information was shared by teachers prior to or after the delivery of the FSHP. It is equally difficult to assure that each individual class received the same information from instructors delivering the FSHP.

In regards to the test taken by the fourth graders, it was impossible to verify all the respondents had attended a FSHP during the previous school year. Another limitation occurs in the home survey. Due to the nature of the questions, some negative responses could be viewed as failing in providing a safe environment for a family. Consequently, respondents may not have been entirely truthful even though the home surveys were anonymous.

## Results

During the interview with the PIO of the AFD, Johnson stated he is responsible for coordination and delivery of the FSHP. He also is a lead instructor in the program. Johnson related the learning objectives of the FSHP were numerous. First and foremost, the students are taught that their responsibility in the event of a house fire is to get out of the house and to stay out. Students are taught the importance of having a working smoke alarm and testing it monthly. They learn to spot hazardous conditions such as unattended candles and overloaded extension



cords and to notify an adult if they observe these conditions. Students are warned of the dangers of playing with matches or lighters and are instructed to inform an adult if they see any child doing so. In the mock kitchen, students are shown how to turn the handles of a pan inward on the stove while cooking to avoid the pan being accidentally pulled from the cook top. Students are encouraged to work with their parents to develop an escape plan that includes two exits from every room. The final demonstration inside the fire safety house is the release of non-toxic smoke while the students are in the mock bedrooms. Students are taught to crawl away from the smoke, exit the structure, and call 911.

Johnson stated there were no published documents or lesson plans for the FSHP. The learning objectives he uses came from the original Program in place when he became the PIO.

The number of times the fire safety trailer had been utilized and the estimated number of students who had been in the trailer were located in unpublished form. The estimations included the delivery of the FSHP to schools in the Amarillo area. Accurate numbers documenting the hours the trailer was made available to the public or to the schools are not recorded.

Observations of the FSHP being presented to students at Forest Hill Elementary and Rolling Hill Elementary were conducted. Three separate instructors spoke with the students. All three instructors stressed the learning objectives identified by Johnson during their presentation, and the message delivered to each group was almost identical. Observations of the Program and responses from the PIO were uniform and definitively established the learning objectives of the AFD's FSHP.

The literature review identified two methods to evaluate the effectiveness of an educational program, satisfying the second research question. By comparing pre- and post-test scores of students participating in the FSHP, a value-added assessment can be made, and the

effect of education can be quantified (Skidmore College, n.d.). Comparisons of test scores up to one year after the presentation of the FSHP will exhibit the level of retention among students (The McKay Foundation, 2008). A positive change in behavior also indicates effective education has taken place (Hungerford & Volk, 1990).

Answers on the pre- and post-tests (Appendix A) were marked as correct or incorrect based on the information presented by the instructors delivering the FSHP. By recording the results of the pre- and post-test scores of third graders and the results of the fourth grade test, comparisons were possible between each group (Appendix E). This answered the third and fourth research questions.

All schools showed an overall increase in test scores after the presentation of the program (Appendix E). There were 191 pre-test surveys completed by the third-graders. Each survey had the same seven questions resulting in 1,337 possible correct responses. The actual number of correct responses from the pre-test survey was 860. Dividing 860 by 1337 reveals a score of 64.3% on the pre-test for third graders. There were 208 third grade post-tests returned with a total of 1,233 correct responses from 1,456 questions. Following the same formula, the post-test score for the third graders was 84.7%. This represents a 20.4% increase in test scores for the third graders after participation in the FSHP.

The fourth graders completed 143 surveys (Appendix E). Utilizing the same procedures, the test score for the fourth-graders was 76.9%. This is a 7.8% drop from the scores posted by the third graders in their post-test but is a 12.6% increase over the third grade pre-test scores. The numerical results of each group are presented in Table 1.

Table 1  
Results of 3<sup>rd</sup> and 4<sup>th</sup> Grade Tests

	<u>Tests</u>	<u>Possible Answers</u>	<u>Correct Answers</u>	<u>Test Scores</u>
3 <sup>rd</sup> grade pre-test	191	1,337	860	64.3%
3 <sup>rd</sup> grade post-test	208	1,456	1,233	84.7%
4 <sup>th</sup> grade test	143	1001	770	76.9%

*Source:* Appendix E

The varying number of tests (Appendix A) returned from each group made numerical comparisons problematic. In an effort to utilize the information more efficiently, responses were expressed as percentages (Appendix E). This allowed changes to be more readily observed.

An examination of Appendix E reveals the question that proved most difficult for both third and fourth graders was question 3. Question 3 was intended to determine if students recognized the importance of crawling away from smoke, one of the learning objectives of the FSHP. Originally, 47.6% of third grade students answered this question correctly on their pre-test. After participation in the FSHP, 60.0% of third graders answered this question correctly. Only 46.2% of fourth graders could answer this question correctly up to one year after participating in the FSHP. Statistically, this was the worst performance on the entire survey. This was the only question that showed a decline in the percentage of correct answers from the third grade pre-test to the fourth grade test.

The most dramatic improvement in the response to a single question was to question 6 (Appendix E). Question 6 asks the direction the handle of a pan should be turned when cooking. Only 32.5% of third grade students answered this correctly on their pre-test. This number rose to 88.5% on the third grade post-test. Fourth graders correctly answered this question 68.5% of the

time. Surprisingly, only 26.4% of fourth graders at Bivins Elementary answered question 6 correctly, far below the average posted by the other schools. The results of questions 3 and 6 are represented in Table 2.

Table 2

## Percentage of Questions 3 and 6 Answered Correctly

<u>Question 3:</u>	<u>Test</u>	<u>Bivins</u>	<u>Belmar</u>	<u>Whittier</u>	<u>Lawndale</u>	<u>Combined</u>
If possible, you	Pre	51.1%	N/A	51.2%	40.3%	47.6%
should always	Post	71.9%	28.6%	61.7%	59.8%	60.0%
<b>crawl away from</b>	Fourth Grade	45.5%	60.6%	34.3%	45.2%	46.2%
<b>smoke.</b>						
<u>Question 6:</u>						
When cooking the	Pre	27.3%	N/A	48.8%	29.0%	32.5%
handle of a pan	Post	92.1%	85.8%	82.5%	91.5%	88.5%
should be <b>pointing</b>	Fourth Grade	26.4%	72.3%	82.9%	61.9%	68.5%
<b>in.</b>						

Source: Appendix E

As a group, the third grade post-test represented the highest scores of the tests (Appendix E). The scores posted by the fourth grade, while not as high as the third grade post-test scores, still showed a marked improvement over the third grade pre-test scores. Question 3 being the noted exception, the tests showed an increase in student knowledge for both third and fourth grade students after participation in the FSHP.

Based on the number of fourth grade tests completed, there were an estimated 108 home surveys (Appendix D) distributed to students. Of these, 49 were returned. There were no home

surveys returned by Whittier Elementary. Of the respondents, 43 of 49 (87.8%) reported that they had a smoke alarm in their home. Of the 43 homes with a smoke alarm, 8 had never tested the alarm, and 30 had tested it less than recommended during the FSHP. When asked about home escape plans, 27 of the 49 (55.1%) respondents indicated that they had an escape plan. Thirteen of those 27 had practiced their escape plan (48.1%). Selected information from Appendix F is in Table 3.

Table 3  
Selected Results of the Fourth Grade Home Survey

	<u>Bivins<sup>a</sup></u>	<u>Lawndale<sup>a</sup></u>	<u>Belmar<sup>a</sup></u>	<u>Combined<sup>a</sup></u>	<u>United States<sup>b</sup></u>
Homes with a Smoke Alarm	90.0%	73.3%	100%	87.8%	96 %
Homes with an Escape Plan	63.6%	60.0%	33.3%	55.1%	66%
Escape Plans Practiced <sup>c</sup>	57.1%	55.6%	0.0%	48.1%	23%

<sup>a</sup>Source: Appendix F. <sup>b</sup>Source: NFPA (2004). <sup>c</sup>Homes without an escape plan were excluded.

The home survey (Appendix D) identified positive behaviors exhibited in the home. Key behaviors identified as indicators of effective education in the literature review were selected, surveyed, and recorded in Appendix F. These numbers were then converted to percentages and compared to results of a Harris Interactive poll (NFPA, 2004). The survey indicated smoke alarms in 87.8% of the homes (Appendix F). This is almost 10% less than the national average of 96%.

Nationally, 66% of households have an escape plan in the event of a fire in the home (NFPA, 2004). Among households in the survey for this project, slightly more than half (55.1%) stated they had an escape plan (Appendix F). Of those in the survey that have an escape plan,

48.1% have practiced it. This is a large improvement over the percentage of people nationally (23%) who have practiced their escape plan (NFPA, 2004).

### Discussion

The learning objectives of the AFD's FSHP are not formally recorded or published. During the interview, Johnson stated several concise leaning objectives from memory. While observing the delivery of the FSHP to several groups of students, it was noted that the instructors did an excellent job covering every learning objective cited by the PIO. Efforts to compare the learning objectives of the AFD's FSHP with similar programs were ineffective. Though a wide search was conducted, published learning objectives of other organizations that operate a FSHP could not be located. Several organizations and fire departments published overall goals of their program, including fire prevention, fire safety education, and burn reduction (CBF, 2008; NOFD, 2008), but the individual learning objectives crucial to education were unavailable.

The standardized test provided an excellent format for comparing and contrasting the results of the tests, as predicted by Goodwin and Driscoll (1980). Following their recommendations, the questions were created specifically to evaluate student knowledge of the learning objectives of the FSHP identified early in the project (Appendix A; Appendix D). When examining the combined test scores for the four schools, the test scores for the third graders were 64.3% before participation in FSHP (Appendix E). Scores after participation in the program rose to 84.7%. The gain of 20.4 percentage points is impressive but still falls short of the goal of 90% retention suggested by Byrne (2008b). Of all the information located, Byrne was the only author to set a target retention rate for fire prevention education.

Focusing on individual questions, the post-tests completed by the third grade students meets, or comes close to, 90% in four of the seven questions (Appendix E). Comparing fourth

grade responses to the post-test scores of the third graders reveals that the 90% goal was reached on four of the seven questions. While Byrne's 90% retention rate (2008b) seems worthy, it is somewhat suspect. If the same principle were applied to other school subjects, every class would maintain an A-B average. This seems highly unlikely, especially with students who are eight or nine years old.

More insight can be gained about the effectiveness of the FSHP by examining the measured increase in knowledge on a question-by-question basis. The pre-test scores show a wide variance in scores, from 27.3% on question 6 at Bivins Elementary to 95.2% on question 7 at Lawndale Elementary (Appendix E). Questions with lower original starting scores showed more dramatic increases than the others. Almost all scores showed an improvement from pre-program levels. The scores that dipped slightly in the post-test survey can be dismissed due to inconsistencies in the number of pre- and post-test administered at each school. Individual school results definitively indicate that some students did not participate in both the pre- and post-test.

The responses on the third grade post-test (Appendix A) can also be used to evaluate the effectiveness of the instruction given in regards to each learning objective. The scores for each targeted learning objective ranged from 81.2% to 93.3%, with one notable exception (Appendix E). Question 3 from the test (Appendix A) states "If you can, always crawl \_\_\_\_\_." The correct answer based on information presented during the FSHP is *away from smoke*. After the presentation of the FSHP, 60.0% of third graders and 46.2% of fourth graders correctly answered this question (Appendix E). This indicates the methods used to teach this one learning objective have not been effective. This answer is a deviation from lessons taught in other programs that stress crawling under smoke. Whether there is confusion among students due to other programs or because of the manner the information is being presented was not determined.

It is Hungerford and Volk's (1990) position that effective education has only taken place if that education has resulted in a positive change in behavior. McLoughlin (1982) stated that a prevention program that resulted in increased knowledge was at least partially successful. The home survey (Appendix D) was designed to identify positive behaviors exhibited in the home environment. Since there was not any local baseline data to compare results with, the data collected was compared with national statistics gathered by the NFPA (2004). The results of the survey showed that the families of students that had participated in the FSHP did not perform as well as others in the nation in two critical areas (Appendix F). The first area was the percentage of homes with a smoke alarm. The home survey showed 87.8% of the homes had a smoke detector. The national average is 96%. Despite participation in the program and an offer of a free smoke alarm, 13.2% of the households in the survey did not have an alarm. The second area was the number of households that had an escape plan. The home survey revealed 55.1% of the households had an escape plan compared to 66% nationally. On the positive side, of the households surveyed that had an escape plan, more practiced the plan (48.1%) than those in the national report (23%).

The schools were chosen based on geographical location as well as socioeconomic factors. A study of the results of Appendix F reveals subtle, yet important, differences from one school to the next. Whittier Elementary, located in the most economically depressed area, did not return any of the home survey forms. It is assumed the fourth grade teachers neglected to send the surveys home with the students. Bivins Elementary straddles two neighborhoods, one consisting of large single-family dwellings and the other comprised of smaller homes and rental properties. The surveys showed this area had smoke alarms in 91% of the homes and 64% had an escape plan in the event of a fire. Lawndale Elementary is located in an older area of the city.



The housing could best be described as moderate starter homes. In this area, almost one out of four households reported that they did not have a smoke alarm. The number of households with an escape plan was essentially the same as that seen in the Bivins area.

Belmar Elementary was the most affluent school in the survey. Every household completing the home survey reported they had a smoke detector (Appendix F). However, only 33% reported that they had an escape plan. The Belmar area experiences considerably less fires than the other areas in the survey. Less exposure to fire losses in the neighborhood may have resulted in a complacent attitude toward fire safety and prevention. This neighborhood's belief that house fires are extremely rare may explain the lower than expected results regarding the number of households with an escape plan.

The original purpose of this project was to determine if the FSHP was effective in educating Amarillo's school children in fire safety and fire prevention strategies. The project shows that students participating in the FSHP have measurably increased their knowledge about fire prevention and fire safety. According to McLoughlin (1982) and The McKay Foundation (2008) this would indicate the program has been successful. However, analysis of the home surveys (Appendix D) indicates the Amarillo area lags behind the nation in fire prevention and fire safety behaviors. Based on the beliefs of Hungerford and Volk (1990), this would indicate the program has been less than successful.

The FSHP has been successful in educating Amarillo's school children. The problem is this increased knowledge is not being converted into safer behaviors in the home. Organizationally, the challenge becomes how to also educate the parents or guardians of children participating in the program. Although the students have the required knowledge, it seems they are not influential enough in the home to change the behavior of the adults.

## Recommendations

The research indicated four recommendations that should be considered. First, a formal lesson plan for the FSHP should be created and stored with other current AFD lesson plans. The lesson plan should include the learning objectives and overall goal of the program. The portion of the program that instructs children to crawl away from smoke should be revised. It is not effective in its current form. Creation of a formal lesson plan will ensure a high quality program is consistently being delivered regardless of who fills the position of PIO or who serves as instructors in the Program.

The second recommendation is to periodically administer a pre- and post-test to FSHP participants at the conclusion of the Program. This would only need to be done three or four times a year. Examination of the results will indicate if the learning objectives are being met and assure an increase in student knowledge is occurring. By comparing the results of students who had different instructors, conclusions can be drawn concerning the effective delivery of each individual learning objective. If the students of one instructor consistently score higher in one or more of the learning objectives, the method the instructor is using can be included in the lesson plan and emulated by other instructors.

The third recommendation is to present a booster program to fourth graders. This would not be another FSHP presentation, but a short handout reiterating the learning objectives taught during the third grade program. There are several pre-printed brochures currently available that address the majority of the learning objectives. Fire Prevention Week could be used as the time to present this program in the schools.

The final recommendation is to develop more accurate records. Any behavioral changes must be documented by examining long-term trends in fire losses in Amarillo. Also, in the

current state of recordkeeping, it is impossible to accurately define the cost of the FSHP. Record keeping should include the total number of hours expended in delivery of the FSHP and the number of participants. This information can be published in the AFD's *Annual Report*. Results of the pre- and post-tests should also be kept as evidence of the effectiveness of the program. Collection of this data would support the creation of a SEA report that could be used to defend the Program during budgetary constraints. The last portion of documentation should come from fire investigations. Any children who were home at the time of the fire should be interviewed. If they learned something during the FSHP that helped them escape the fire, it should be documented. Considering the economic outlook, the FSHP could be one of several programs facing a reduction in budget. Several testimonials from school children crediting the FSHP for teaching them the lessons needed to survive an actual event could be very influential with elected officials.

Future readers wishing to begin or evaluate similar programs should start by speaking with the individuals responsible for the delivery of FSHPs. Examine lesson plans, if available, and identify the learning objectives of the program. Next, observe the program as it is being delivered. This will assure the stated goals of the program and the information being presented is consistent. Pre- and post-tests are an excellent way to measure an increase in knowledge. The tests must be written to fit your program and address each of your learning objectives. It is strongly suggested that program personnel administer the tests instead of depending on school staff to perform this function. This will ensure consistent testing methods, a consistent number of returns and save a considerable amount of time when tallying the results. Home surveys will give you a benchmark for comparisons to national averages. More importantly, the home surveys will

give you a baseline when evaluating the effect of changes in a program or the benefit of a new program in the future.

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## Appendix A

3<sup>rd</sup>/4<sup>th</sup> Grade Fire Safety House Pre/Post Test

Circle one answer please.

1. What is your job if your house catches on fire?
  - a. Stop, Drop and Roll
  - b. Get Out and Stay Out
  - c. Find an adult
  
2. What two things do you need to get away from a fire in your house?
  - a. A smoke alarm and an escape plan
  - b. An adult and a phone
  - c. A dog and an escape ladder
  
3. If you can, always crawl \_\_\_\_\_.
  - a. Under smoke
  - b. Toward smoke
  - c. Away from smoke
  
4. Smoke alarms on your ceiling should be tested once every \_\_\_\_\_?
  - a. Day
  - b. Month
  - c. Year
  
5. If you see kids playing with matches or fire, you should \_\_\_\_\_.
  - a. Tell an adult
  - b. Make them stop
  - c. Run away from them
  
6. When someone is cooking, the handle of the pan should be \_\_\_\_\_.
  - a. Taken off
  - b. Pointing out
  - c. Pointing in
  
7. Most house fires start in the \_\_\_\_\_.
  - a. Kitchen
  - b. Living room
  - c. Bathroom

Appendix B

Letter for Third Grade Teachers

October 25, 2008

Dear Third Grade Teachers,

We are currently evaluating the effectiveness of the Fire Safety House Program (FSHP). Please have your students complete the attached survey before the FSHP comes to your school. The survey can be completed on the day the Fire Safety House is scheduled or a few days before. The same survey should be taken as soon as possible after presentation of the FSHP. The information gathered from these surveys will be used to modify the current program and result in a better learning opportunity for all school children in Amarillo. Information gathered from these surveys will be compared to surveys given to fourth graders who participated in the program last year. We realize there are many demands on your time in the classroom and truly appreciate any help you can give us for this evaluation.

Thank you,

Greg Mayes, District Chief  
Amarillo Fire Department  
378-3506/671-4437

Appendix C

Letter for Fourth Grade Teachers

October 25, 2008

Dear Fourth Grade Teachers,

We are currently evaluating the effectiveness of the Fire Safety House Program (FSHP). The FSHP will be presented to the third graders at your school in the very near future. If possible, please have your students who participated in the program last year to complete the 7-question survey attached. There is a survey for the parents to complete also. The information gathered from these surveys will be used to modify the current program and result in a better learning opportunity for all school children in Amarillo. Information gathered from these surveys will be compared to surveys given to third graders who are participating in the program this year. The Home survey will be used to assess any change the program may have had on behaviors at home. We realize there are many demands on your time in the classroom and truly appreciate any help you can give us for this evaluation.

Thank you,

Greg Mayes, District Chief  
Amarillo Fire Department  
378-3506/671-4437

## Appendix D

## Fourth Grade Fire Safety House Home Survey

*Parents,*

*Please take a few minutes to fill out this survey and return it to school with your child within the next couple of days. We are evaluating our Fire Safety Program and this information will be used to make any necessary changes in the Program.*

*Thank you,*

*Greg Mayes, AFD District Chief*

Circle one answer please.

1. Do you have a smoke alarm in your home?
  - a. Yes
  - b. No
  
2. How many times in the last year have you tested you smoke alarm?
  - a. 0
  - b. 1-5
  - c. 6-12
  - d. More than 12
  - e. Don't have a smoke alarm
  
3. Does your family have an escape plan in case of a fire?
  - a. Yes
  - b. No
  
4. If you have an escape plan, have you practiced it with your family?
  - a. Yes      How many times? \_\_\_\_\_
  - b. No
  - c. Don't have an escape plan
  
5. Can your child/children open their bedroom window if there is a fire in your home?
  - a. Yes
  - b. No
  - c. Don't know
  
6. Has your child every discussed Fire Safety with you after a school program?
  - a. Yes
  - b. No

## Appendix E

## Results of Pre- and Post-Test of Third and Fourth Grade Students

<u>School/Test</u>	<u>Surveys</u>	<u>Percentage of Correct Answers By Question</u>						
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Bivins</u>								
3 <sup>rd</sup> pre	88	45.5 %	82.9 %	51.1 %	54.5 %	67.0 %	27.3 %	86.4 %
3 <sup>rd</sup> post	89	97.8 %	79.8 %	71.9 %	86.5 %	86.5 %	92.1 %	97.8 %
4 <sup>th</sup> grade	33	66.7 %	78.8 %	45.5 %	66.6 %	78.8 %	26.4 %	93.9 %
<u>Belmar</u>								
3 <sup>rd</sup> pre	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3 <sup>rd</sup> post	14	71.4 %	85.8 %	28.6 %	64.3 %	85.8 %	85.8 %	100 %
4 <sup>th</sup> grade	33	84.8 %	93.9 %	60.6 %	87.9 %	97.0 %	72.3 %	100 %
<u>Whittier</u>								
3 <sup>rd</sup> pre	41	68.3 %	75.6 %	51.2 %	90.2 %	87.8 %	48.8 %	95.1 %
3 <sup>rd</sup> post	57	93.0 %	78.9 %	61.7 %	91.2 %	89.5 %	82.5 %	93.0 %
4 <sup>th</sup> grade	35	74.3 %	85.7 %	34.3 %	80.0 %	80.0 %	82.9 %	100 %
<u>Lawndale</u>								
3 <sup>rd</sup> pre	62	64.5 %	82.3 %	40.3 %	62.9 %	82.3 %	29.0 %	95.2 %
3 <sup>rd</sup> post	48	98.0 %	87.2 %	59.8 %	78.7 %	91.5 %	91.5 %	98.0 %
4 <sup>th</sup> grade	42	81.0 %	83.3 %	45.2 %	88.1 %	88.1 %	61.9 %	97.6 %
<u>All Schools</u>								
3 <sup>rd</sup> pre	191	56.5 %	81.1 %	47.6 %	64.9 %	76.4 %	32.5 %	91.1 %
3 <sup>rd</sup> post	208	93.3 %	81.2 %	60.0 %	84.1 %	88.0 %	88.5 %	96.2 %
4 <sup>th</sup> grade	143	76.9 %	85.3 %	46.2 %	81.1 %	86.0 %	68.5 %	97.9 %

## Appendix F

## Results of the Fourth Grade Home Survey

	<u>Bivins</u>	<u>Lawndale</u>	<u>Belmar</u>	<u>Combined</u>
<u>Do you have a smoke alarm in your home?</u>				
Yes	20	11	12	43
No	2	4	0	6
<u>How many times have you tested your smoke alarm?</u>				
Zero	3	1	4	8
1 to 11	12	10	8	30
12 or more	5	0	0	5
Don't have a smoke alarm	2	4	0	6
<u>Do you have an escape plan in case of a fire?</u>				
Yes	14	9	4	27
No	8	6	8	22
<u>Have you practiced your escape plan?</u>				
Yes	8	5	0	13
No	6	4	4	14
Don't have an escape plan	8	6	8	22
<u>How many times have you practiced your escape plan?</u>				
Never	7	4	4	15
Less than 12	5	5	0	10
12 or more	2	0	0	2
Don't have an escape plan	8	6	8	22
<u>Can your child open their bedroom window?</u>				
Yes	15	11	6	32
No	7	4	1	12
Don't know	0	0	5	5
<u>Has your child ever discussed fire safety with you after a school program?</u>				
Yes	18	15	9	42
No	4	0	3	7

*Note:* Whittier Elementary did not return any home surveys