

# Youth Preparedness in the United States: Assessing the Impact of the American Red Cross's "Prepare with Pedro!" Program

---

JULIA SANDBERG | DIVISION OF RISK MANAGEMENT AND  
SOCIETAL SAFETY | LTH | LUND UNIVERSITY, SWEDEN



**Youth Preparedness in the United States:  
Assessing the Impact of the American Red Cross's  
"Prepare with Pedro!" Program**

**Julia Sandberg**

**Lund 2022**

**Title:** Youth Preparedness in the United States: Assessing the Impact of the American Red Cross’s “Prepare with Pedro!” Program

**Author:** Julia Sandberg

**Number of pages:** 62

**Illustrations:** Figure 1 (American Red Cross, 2017b), all other figures (the author)

**Keywords:** Disaster preparedness, children and families, DRR preparedness education programs, fire safety

### **Abstract**

Home fires are the most prevalent and preventable disaster in the United States. It is notoriously difficult to teach disaster preparedness skills to adults. But, when their children are taught this material, households are more likely to make changes. The purpose of this thesis is to examine the impact of the American Red Cross’s “Prepare with Pedro!” youth disaster preparedness program on students’ and their families’ knowledge of and attitudes toward fire safety material. The thesis examines three research questions which focus on students’ overall knowledge, topic-specific knowledge and attitudes, and the knowledge of their adults. This thesis used an evaluation study methodology, examining the results of a pre-presentation test and post-presentation test for 12 classes in four U.S. states, as well as a 1-week post-presentation test and a family survey for three of the classes. Overall, students did significantly better answering questions after the presentation, and all but one question achieved higher scores that were statistically significant. While results were limited, the family survey found that most households had discussed the Prepare with Pedro material and made some changes at home. The American Red Cross’s Prepare with Pedro program had a generally positive impact on the students who participated and their households’ knowledge of fire safety and attitudes toward feeling prepared for a home fire. However, further research, particularly longitudinal studies and work focused on the spread of knowledge to households, is needed to expand knowledge on this topic.

© Copyright: Division of Risk Management and Societal Safety, Faculty of Engineering  
Lund University, Lund 2022

Avdelningen för Riskhantering och samhällssäkerhet, Lunds tekniska högskola, Lunds universitet, Lund 2022.

---

Riskhantering och samhällssäkerhet

Lunds tekniska högskola

Lunds universitet

Box 118

221 00 Lund

<http://www.risk.lth.se>

Telefon: 046 - 222 73 60

Division of Risk Management and Societal Safety

Faculty of Engineering

Lund University

P.O. Box 118

SE-221 00 Lund

Sweden

<http://www.risk.lth.se>

Telephone: +46 46 222 73 60

## **Acknowledgements**

I want to start by thanking the wonderful staff at the American Red Cross for their support throughout this process, particularly Sam Johnson and Kristee Lauro. This thesis would not have been possible without their assistance in providing the necessary tools and data.

Additionally, I want to thank the American Red Cross staff, AmeriCorps staff, teachers, and students who taught and participated in the Prepare with Pedro program as part of this thesis.

Furthermore, I want to thank my supervisor, Marcus Abrahamsson for his advice and comments, and for answering all of my many questions!

I also want to thank my friends and family for their invaluable love and support. In particular, I want to thank my mom for her helpful editing comments, and my dad and brother for their encouragement. I want to thank my Lund friends for all of the fun adventures and fika breaks we've had both during this thesis process and in the past two years. You all inspire me every day.

Finally, I would like to thank my dog, Dobby, who was a very good audience for many practice presentations of "Prepare with Pedro!" and is now (hopefully) very well educated in home fire safety.

## Summary

Children have long been regarded solely as victims and dependents in disaster situations. But new research places children in a position of power to help their families prepare for and respond to disasters. In the United States, home fires are the most prevalent and deadliest disaster, but are also one of the most preventable. Youth preparedness education programs aim to educate children about disasters, so that they can be personally prepared and pass this information onto their households. One such program is the American Red Cross's "Prepare with Pedro!" program which teaches disaster preparedness skills to children in the grades of kindergarten, 1st grade, and 2nd grade (5- to 8-year-olds). This thesis examined the impact of the Prepare with Pedro: Home Fire program on students and their households' knowledge of home fire skills and attitudes toward preparedness.

This thesis used an evaluation study methodology. This involved examining the Prepare with Pedro program through 12 different presentations in four U.S. states. Each of the presentations involved a pre-test and post-test. These each had five questions, which tested students' knowledge of fire safety topics, in addition to their personal feelings of preparedness. Three of the classes also participated in a 1-week post-presentation test, as well as a survey that was sent out to the students' families.

The pre-test, post-test, and 1-week post-test were all examined in relation to how the presentation impacted students' knowledge of fire safety overall, and how they impacted knowledge of individual topics and feelings of preparedness. It was found that overall, students' knowledge of and attitudes toward fire safety improved after the presentation. This improvement was still apparent 1 week after the presentation. Some of the questions saw greater increases in correct answers than others. The results from all but one question resulted in a p-value of lower than 5 percent when a one-way ANOVA test was done, indicating statistical significance. The question without statistical significance focused on the sound a fire alarm makes, and many students seemed to already know the answer to this question before the presentation. The other questions, which focused on assessing the students' knowledge of the importance of fire drills, and the importance of testing smoke alarms, were all questions that the students did well on after the presentation. More students also indicated that they felt prepared for a home fire after the presentation.

The family survey examined the students' adults reported knowledge. While this survey was sent out to the adults of 65 students, there were only 15 responses, and eight of these were incomplete. All but two of the adults discussed the Prepare with Pedro material with their students. The survey also found that ten households made changes at home, including testing their smoke alarm, making an emergency plan, practicing their fire drill, and making a family emergency supply kit. Two questions tested adults' knowledge of Prepare with Pedro's content, and the majority of adults answered these questions correctly.

The discussion included two sections, one examining the impact of Prepare with Pedro on students' knowledge and attitudes, and one exploring the impact on adults' knowledge. The section focused on children explores children's knowledge both overall, as well as knowledge and attitudes in relation to specific topics. Fire drills, the testing of fire alarms, and the sound they make were all discussed as topics that are both important and had increases in student knowledge after the Prepare with Pedro presentation. However, the sound a fire alarm makes was a topic that the students already seemed to be familiar with, perhaps due to school fire

drills. The question regarding smoke was discussed as having potentially confusing wording. However, students did seem generally to answer this question correctly. Prepare with Pedro also led to an increase in feelings of preparedness for the students, which is an important part in empowering them. Potential barriers to knowledge retention, possible biases, and the potential impact of having a presentation in person or presented virtually were also briefly discussed. The second section examined the results of the family survey, and whether the results were indicative of changes at home. The lack of response was discussed in the context of adults being typically unenthusiastic participants in preparedness education, and how the reliance of 5-to-8-year-olds on their adults might make it more likely for adults to follow through and do preparedness activities.

Overall, the thesis found that the American Red Cross's Prepare with Pedro program had a generally positive impact on the students who participated and their households' knowledge of and attitude toward fire safety. However, further research, particularly longitudinal studies and work focused on the spread of knowledge to households, is needed to expand knowledge on this topic. Further work on providing feedback to programs like Prepare with Pedro is necessary so that youth preparedness education programs can improve and deliver the best knowledge and skills to children.

**List of Abbreviations**

ANOVA      Analysis of Variance  
CCDRR      Child Centered Disaster Risk Reduction  
FEMA        Federal Emergency Management Agency  
U.S.         United States

**Table of Figures**

Figure 1. Cover of Prepare with Pedro: Home Fire (American Red Cross, 2017b). ..... 2  
Figure 2. Bar graph showing the division of participating students and classes divided by state and class number. .... 8  
Figure 3. Bar graph showing the number of adults who filled out the family survey for each class in Maryland. .... 13  
Figure 4. Bar graph showing the differences between the pre-test and post-test averages for each of the classes. .... 16  
Figure 5. Bar graph showing the differences between the pre-test and post-test averages for each of the questions in the Prepare with Pedro program. .... 16  
Figure 6. Bar graph showing the average scores for Classes 1, 3, and 4 for the pre-test, post-test, and 1-week post-test. .... 18  
Figure 7. A bar graph comparing the scores of students in Class 1 for each question as well as overall, before, after, and 1 week after the Prepare with Pedro presentation..... 18  
Figure 8. A bar graph comparing the scores of students in Class 3 for each question as well as overall, before, after, and 1 week after the Prepare with Pedro presentation..... 19  
Figure 9. A bar graph comparing the scores of students in Class 4 for each question as well as overall, before, after, and 1 week after the Prepare with Pedro presentation..... 19  
Figure 10. Bar graph showing the differences in average percent of correct answers for each question, divided by in-person and virtual presentations, as well as before and after the presentation ..... 20  
Figure 11. Bar graph showing the percent of students who answered Question 1 correctly before versus after the presentation, divided by class. .... 20  
Figure 12. Bar graph showing the percent of Maryland students who answered Question 1 correctly, before, after, and 1 week after the presentation. .... 21  
Figure 13. Bar graph showing the percent of students who answered Question 2 correctly before versus after the presentation, divided by class. .... 22  
Figure 14. Bar graph showing the percent of Maryland students who answered Question 2 correctly, before, after, and 1 week after the presentation. .... 22  
Figure 15. Bar graph showing the percent of students who answered Question 3 correctly before versus after the presentation, divided by class. .... 23  
Figure 16. Bar graph showing the percent of Maryland students who answered Question 3 correctly, before, after, and 1 week after the presentation. .... 23  
Figure 17. Bar graph showing the percent of students who answered Question 4 correctly before versus after the presentation, divided by class. .... 24  
Figure 18. Bar graph showing the percent of Maryland students who answered Question 4 correctly, before, after, and 1 week after the presentation ..... 25

Figure 19. Bar graph showing the percent of students who answered Question 5 correctly before versus after the presentation, divided by class. ....	26
Figure 20. Bar graph showing the percent of Maryland students who answered Question 5 correctly, before, after, and 1 week after the presentation .....	26
Figure 21. A pie chart showing the results of Question 1 in the Family Survey. ....	27
Figure 22. A pie chart showing the results of Question 2 in the Family Survey. ....	27
Figure 23. A pie chart showing the results of Question 3 in the Family Survey. ....	28
Figure 24. A pie chart showing the results of Question 4 in the Family Survey. The correct answer is “monthly” .....	28
Figure 25. A pie chart showing the results of Question 5 in the Family Survey. The correct answer is “get low and go” .....	29



**Table of Contents**

- Acknowledgements ..... ii
- Summary ..... iii
- List of Abbreviations ..... v
- Table of Figures ..... v
- 1. Introduction ..... 1
  - 1.1 General Background..... 1
  - 1.2 Purpose and Research Questions..... 2
  - 1.3 Previous Research ..... 2
  - 1.4 Importance..... 3
  - 1.5 Limitations ..... 3
  - 1.6 Thesis Outline ..... 4
- 2. Conceptual Framework ..... 5
  - 2.1 Concepts ..... 5
  - 2.2 An Overview of Concepts Taught in Prepare with Pedro ..... 6
- 3. Methodology ..... 8
  - 3.1 Evaluation Study ..... 8
  - 3.2 Presentations..... 9
  - 3.3 Data Collection..... 10
  - 3.4 Data Analysis ..... 13
  - 3.5 Limitations of the Data..... 13
- 4. Results ..... 15
  - 4.1 Did the students’ knowledge of home fires increase after the Prepare with Pedro program?..... 15
  - 4.2. In which areas does student knowledge increase and not increase? ..... 20
    - 4.2.1 Question 1 ..... 21
    - 4.2.2 Question 2 ..... 21
    - 4.2.3 Question 3 ..... 23
    - 4.2.4 Question 4 ..... 24
    - 4.2.5 Question 5 ..... 25
  - 4.3 What knowledge do the students' adults report having? ..... 26
    - 4.3.1 Question 1 ..... 27
    - 4.3.2 Question 2 ..... 27
    - 4.3.3 Question 3 ..... 28
    - 4.3.4 Question 4 ..... 28

4.3.5 Question 5 .....	29
4.3.6 Comments and Comparison of Respondents .....	29
5. Discussion .....	30
5.1 Students' Knowledge of Home Fire Safety Material .....	30
5.1.1 Overall .....	30
5.1.2 Fire Drills and Smoke .....	31
5.1.3 Smoke Alarms .....	33
5.1.4 Preparedness .....	33
5.1.5 Potential Barriers to Knowledge Retention and Possible Bias .....	34
5.1.6 Impact of Setting: In Person Versus Virtual .....	35
5.2 Adults' Knowledge of Home Fire Safety Material .....	35
5.2.1 Interpreting the Survey .....	36
5.2.2 Lack of Response and Teaching Preparedness to Adults .....	36
6. Conclusion .....	38
6.1 Key Findings and Prepare with Pedro's Impact .....	38
6.2 Next Steps .....	38
References .....	40
Appendix A: Prepare with Pedro Learning Objectives .....	45
Appendix B: Pre-Test, Post-Test, and 1-week Post-Test Results .....	46
Appendix C: SPSS One-Way ANOVA Results .....	49
Appendix D: Family Survey Results .....	51
Appendix E: Pedro's Safety Checklist .....	52

# 1. Introduction

## 1.1 General Background

One in five American families will experience a fire in their home at some point in time (Jones and Ollendick, 2002: 175). Home fires are the most prevalent disaster in the United States (U.S.), and are often the deadliest, with an average of seven lives lost per day (American Red Cross, 2017a; Ahrens and Everts, 2021: 1). However, they are also one of the most preventable emergencies (American Red Cross, 2017a). Between 2014 and 2018, three out of five home fire deaths occurred in properties that had no smoke alarms or where smoke alarms failed to operate (Ahrens, 2021: 1). Some organizations offer free or reduced-price smoke alarms and installing and testing a smoke alarm takes minutes but can lower risk of death during a home fire significantly, with the National Fire Protection Association finding the death rate is “55 percent lower in homes with working smoke alarms than in homes with no alarms or alarms that fail to operate” (Ahrens, 2021: 1). A fire can turn deadly in under two minutes, so it is essential everyone in a household is able to get out in this time frame, meaning that preparation and practice are of the utmost importance (U.S. Department of Homeland Security, 2021a). Given their dependence on adults, young children are especially vulnerable to the effects of fire. Between 2010 and 2019, 963 American children between the ages of 5 and 9 died in fires (U.S. Fire Administration, 2019). However, recently, the risk of children dying in a fire has decreased, and children now have a relative risk of dying in a fire that is lower than that of the general population (U.S. Fire Administration, 2019). This decrease is attributed, in part, to increased education and knowledge about fire safety and preparedness.

While it is important that adults are educated about fire safety, previous research has found public disaster education is “failing to motivate adults to take preparedness measures” and therefore, emergency management agencies are increasingly targeting children as an audience with this education (Johnson et al., 2014b: 108). Children are able to motivate their households to make important disaster preparedness changes and are often particularly motivated after learning about disasters in school (Kourofsky and Cole, 2010: 85). A 2011 study by the Federal Emergency Management Agency (FEMA) found households with children who brought home preparedness materials from school were significantly more likely to have done preparedness actions (e.g., 75 percent more likely to have a household plan and twice as likely to have practiced a home drill) than families whose children did not bring materials home (FEMA, 2014: 33). Given the high likelihood of home fires and the importance of preparedness if they do occur, it is essential that all members of a household are knowledgeable in what needs to happen beforehand.

In collaboration with FEMA, the American Red Cross is working to educate children in emergency preparedness with two programs. The Pillowcase Project is for children aged 8 to 11, while “Prepare with Pedro!” is for those aged 5 to 8 (American Red Cross, 2022b). The Prepare with Pedro program is the focus of this thesis. It was implemented in 2017 and has reached 100,000 students to date (American Red Cross, 2022a).

Prepare with Pedro includes a series of books, each of which follows along as a penguin named Pedro learns about different hazards and how to prepare for them (American Red Cross, 2022b). Each book (see Figure 1) has an associated presentation that is given by Red

Cross volunteers or staff at schools, camps, or in other educational settings. The interactive presentation gives children the opportunity to practice skills and answer questions. Home fires are the hazard that is taught about most frequently, because they can occur anywhere in the U.S., regardless of geographical location. In the Prepare with Pedro: Home Fire presentation, the children are taught about the sound a smoke alarm makes (“BEEP BEEP BEEP”), that smoke alarms should be tested by their adults every month, that every family should make an emergency plan, to “get low and go” if there is smoke, and coping skills that can be used in any stressful situation (American Red Cross, 2017b).

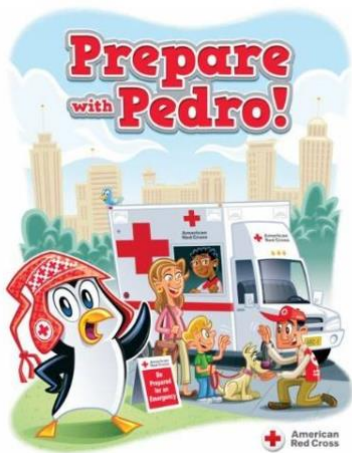


Figure 1. Cover of Prepare with Pedro: Home Fire (American Red Cross, 2017b).

### ***1.2 Purpose and Research Questions***

The purpose of this thesis is to assess the impact of the American Red Cross’s “Prepare with Pedro!” program on students’ knowledge of and attitude toward home fires as an emergency and how to prepare for them, as well as to determine whether the program leads to any increased knowledge of the material for their parents/guardians. This research is carried out through an evaluation study focused on the implementation of the Prepare with Pedro program in the U.S. states of Maryland, New York, California, and New Hampshire.

The main question this thesis aims to answer is: What impact does the Prepare with Pedro: Home Fire program have on students and their households’ knowledge of and attitude toward home fires? To answer this question, the thesis uses three smaller-scale questions: First, does the

students’ knowledge of home fires increase after the Prepare with Pedro program; secondly, in which areas does student knowledge and positive attitudes increase and not increase? Finally, what knowledge do the students’ adults report having?

### ***1.3 Previous Research***

Up until recently, children’s experiences during disasters have been viewed as those of victims of circumstance or completely ignored by literature and policy (Peek, 2008: 4). An interest in children and disasters is fairly new within academia and policy, and most papers focused on this topic were published after 1990 (Peek et al., 2018: 247). While that is changing, with over 800 pieces of literature on children and disasters written between 2010 and 2016, the narrative of children as victims of circumstance is still prevalent (Peek et al., 2018: 248). This increase is due in part to recent efforts to include children’s needs in thinking and center children as agents of change within discussions of disaster risk management.

This thesis builds on previous research on youth disaster preparedness programs and fire education programs for children. A systematic review by Ronan et al. found that between 2000 and 2015, 37 papers on youth disaster preparedness programs were published (2015: 58). Of these, 10 employed some form of a pre-test and post-test, which is similar to this paper’s methodology (see Chapter 3) (Ronan et al., 2015: 58). Most are similar to this paper

in that they focus on a particular program, or alternatively, compare multiple programs and examine these programs' impact on knowledge, attitudes, and behavior (see Johnson, 2011; Johnson et al., 2014b; Ronan and Johnston, 2003; among others). A 2017 study by White for the Red Cross on the Pillowcase Project in Australia and Mexico also served as inspiration for this thesis (White, 2017). White's impact study looked at students' understanding of the material before and after the Pillowcase Project presentation, as well as their parents' understanding of the material (White, 2017). A 2020 study by Pooley et al. identified 25 evidence-based practices for effective fire safety education programs for children, which this thesis discusses in relation to the Prepare with Pedro program (2020: 35).

Additionally, this thesis is based on a broader understanding of children's disaster preparedness informed by the work of Victoria A. Johnson, David M. Johnston, Lori Peek, and Kevin R. Ronan. Research that views children both as a vulnerable group, but also one that has agency has increased in the past several decades (Peek, 2008: 14).

### ***1.4 Importance***

While children are increasingly a focus of disaster research, a critical literature review of children's disaster preparedness education found a need for more empirical research analyzing the impact of teaching disaster preparedness to young people (Ronan et al., 2015: 57). Research focused on this topic is essential in helping policy makers and practitioners understand which programs are successful and why (Peek et al., 2018: 13). While it is valuable to examine children as a group, the disaster preparedness capabilities of a five-year-old and those of a fifteen-year-old differ greatly. More research is needed that examines the capabilities of different ages, and the impact that age-appropriate preparedness education can have on them.

Fire safety skills can be lifesaving and are important throughout one's life. Not only can fires injure or kill a person, but they can lead to mental and psychological damage that can be especially detrimental to children (Jones and Ollendick, 2002: 175). Learning these skills early can protect a person throughout their life. Prepare with Pedro aims to introduce knowledge about home fires and protective skills to children at a young age, so that discussions occur at home, leading to greater fire safety for both adults and children (American Red Cross, 2020). Increased awareness about programs such as Prepare with Pedro and their benefits is also essential as it allows for qualified volunteers to teach information to children and answer their questions. While 100,000 students have been taught as part of the Prepare with Pedro program since 2017 (American Red Cross, 2022a), there are over 11 million kindergarteners, 1st graders, and 2nd graders in the U.S.<sup>1</sup> It is important that programs such as Prepare with Pedro are analyzed so it is clear what students learn, what can be improved, and what broader household impacts they lead to.

### ***1.5 Limitations***

Two main factors limited the research conducted for this thesis — the Covid-19 pandemic and time. The Covid-19 pandemic restricted the ability of Red Cross employees, volunteers,

---

<sup>1</sup> Based on U.S. National Center for Education Statistics (there are 340 million Pre-K to 8th graders in the U.S., which is an average of 3.8 million students per grade) (National Center for Education Statistics, 2021).

and the author to go to elementary schools in person to present Prepare with Pedro. While some schools allowed for Zoom presentations or, over time even some in-person presentations, this was far more limited than before the pandemic. Presenting online or in socially distanced in-person environments meant the presentation had to be adapted to be less interactive (e.g., due to Covid-19 restrictions, an activity where students practice crawling under “smoke” was not done in most of the presentations). The thesis was also limited by the time span allotted for writing, researching, and collecting data. Doing the Prepare with Pedro presentation in more states than the four included in this paper would add more nuance and data but given both the Covid-19 pandemic and time, this was not possible. While it would be interesting to follow up with the students in the months following the presentation, this was also not possible given the time span allowed for the thesis. A longitudinal study of the impact of the Red Cross’s youth preparedness education programs would give insight into the project’s sustainability and does represent a possibility for future research. This will be discussed further in Chapter 6.2.

### ***1.6 Thesis Outline***

This thesis is split into six chapters. This thesis outline is the final part of Chapter 1, which focused on introducing the thesis topic, research purpose and research questions, previous research, as well as project limitations. Chapter 2 discusses and defines the main concepts and ideas relevant to the thesis, while Chapter 3 describes the methodology and methods, data collection methods, and data analysis methods. Chapter 4 presents the results of the data collection and data analysis. In Chapter 5, the results are discussed in relation to the research questions and previous research. Final conclusions, including key findings and potential next steps, are found in Chapter 6.

## 2. Conceptual Framework

### 2.1 Concepts

Disaster management focuses on the “reduction of harm to life, property, and the environment” through four components (Coppola, 2011: 1). Preparedness is one of these four components (Coppola, 2011: 9), and can be defined as “actions taken in advance of a disaster to ensure adequate response to its impacts, and the relief and recovery from its consequences” (Coppola, 2011: 251). While preparedness involves various actions aiming to increase awareness, such as exercises and trainings, the focus of this thesis is public preparedness education. The objective of disaster education as defined in the 2005 Hyogo Framework for Action is “to build a culture of safety and resilience at all levels” and was one of the focuses of that framework (UNISDR, 2005: 9). Preparedness education focuses on increasing awareness of the hazard risk (increasing knowledge and changing attitudes), behavior change, and understanding of warnings (Coppola, 2011: 272). This thesis mainly focuses on the increasing awareness aspect of preparedness education.

Youth preparedness education can be understood as public preparedness education adapted to best teach youth. The terms “youth” and “children” are used interchangeably in this paper, despite generally referring to different age ranges that overlap: youth is usually understood to be ages 15-24 (UN Youth, 2013), while children are ages 0-18 (UN General Assembly, 1989). However, literature focused on preparing children for disasters generally refers to such education as “youth preparedness education” despite its focus on educating *children* (FEMA, 2010). This usually includes adapting materials, so they are simple and easier for a younger audience to understand and making them interactive. With the Prepare with Pedro: Home Fire program, fire safety information is taught through a story and interactive activities.

Youth preparedness education is part of a movement towards child-centered disaster risk reduction (CCDRR). CCDRR works to build children’s capacity so they can be their own advocates, involving them in disaster risk reduction and strengthening their communities (Asian Disaster Preparedness Center et al., 2010: 8-9). In the context of disaster preparedness education programs, CCDRR changes risk communication from a top-down to a bottom-up approach where children are centered as a source of risk communication information for their families and communities (Mitchell et al., 2008: 271). In a bottom-up approach, information can be passed more often and swiftly to family groups through schools and educational programs, rather than imparting it during a small window of opportunity as typically occurs with risk communication information for adults (Mitchell et al., 2008: 259). Using CCDRR strategies, the Prepare with Pedro program exemplifies this bottom-up approach.

This thesis focuses on impact in the form of increases in knowledge and changes in attitude. Attitude is defined as “a feeling or opinion about something” (Cambridge University Press, n.d.a). Knowledge is defined as “skill in, understanding of, or information about something, which a person gets by experience or study” (Cambridge University Press, n.d.b). The focus is on *knowledge*, rather than *learning*, which is the process of gaining knowledge (Cambridge University Press, n.d.c). This distinction is important because while knowledge can lead to increased preparedness, learning requires repetition and for knowledge to be retained long term, which cannot be evaluated within this thesis. Prepare with Pedro’s overall

aim is not only for students to gain knowledge, but to be prepared to use these concepts during emergencies and to prepare their families and communities for a possible emergency (see Appendix A). However, given that these are long-term goals and require long-term retention of knowledge, which was not possible to assess within the thesis's scope, the focus is on knowledge of concepts and preparedness actions, rather than actual changes in long-term preparedness.

The Prepare with Pedro program focuses on teaching children protective actions (actions taken to decrease the effects of disasters) and coping skills (techniques used in stressful situations to adjust one's reaction), which are both essential to preparedness (American Red Cross, 2020: 1). Each of the Prepare with Pedro presentations focuses on teaching children to "be prepared" and "take action". The protective actions presented include making a family fire safety plan and practicing it, testing smoke alarms, and making sure to get low if there is smoke during a home fire (American Red Cross, 2017b). Each presentation also encourages families to make an emergency kit, which is important for all types of emergencies (American Red Cross, 2022b). Despite being for young children ages 5-8, the Prepare with Pedro program depicts children as capable, knowledgeable, and able to make an impact within their households. This representation is not new within American Red Cross programs, as Masters of Disaster, a child preparedness program from 1999 (Wachtendorf et al., 2008: 461), and its current Pillowcase Project also encourage these skills (American Red Cross, 2022b). The coping skill taught as part of Prepare with Pedro is a breathing technique to ease stress and anxiety (American Red Cross, 2017b). While some of these skills are specific to home fires, others, such as the coping skill and making an emergency kit, can be used during any emergency situation or even stressful non-emergency situations.

## ***2.2 An Overview of Concepts Taught in Prepare with Pedro***

A home fire is any fire that occurs in a domestic structure (e.g., an apartment, a house) and is characterized as a human-made disaster with high unpredictability, low controllability, and powerful impact (Jones and Ollendick, 2002: 176). Lives can be saved by smoke alarms which make a loud beeping sound when they detect fire or smoke. However, as previously mentioned, smoke alarms are often not installed correctly or tested properly, which can lead to them failing in the case of an emergency. To prepare for fires, it is also important to practice home fire drills. A fire drill is when the adult members of a household press the smoke alarm's test button and practice leaving different areas of their home in under 2 minutes, as if there were a real fire. When practicing a fire drill, it is important to have made a plan so everyone meets at the same location outside. If there is smoke, it is important to crawl on the floor to avoid it, as smoke rises.

Throughout the Prepare with Pedro program inclusive language and images are used, and this language will also be used throughout this paper. This includes referring to the students' "adults" which includes all trusted adults in their household, whether these are parents, grandparents, family members, or guardians. The books show children of a variety of circumstances and backgrounds. Disasters are referred to as "emergencies" because of the students' ages and the word's emotional connotations. While disasters can be seen as scary and events where children lack agency, "emergencies" are viewed as more short-term events



that can be dealt with fairly quickly. An emergency could be something small, like losing your house keys, as well as a larger event — like a home fire.

### 3. Methodology

This chapter outlines the methodological approaches used to conduct this research, collect data, and analyze that data. It also presents the limitations of this research.

#### 3.1 Evaluation Study

This thesis used an evaluation study methodology. An evaluation study is focused “mainly on determining the effectiveness of programs or materials” (Reinking, Alvermann, 2005: 143). This thesis examines the program’s effectiveness in improving children’s understanding of fire safety education. The Prepare with Pedro program is taught by the American Red Cross across the U.S. However, it is beyond this paper’s purpose and scope to analyze presentations in every state and context, and therefore four states were chosen.

The states used for this thesis are California, New York, New Hampshire, and Maryland. California and New York were selected due to the presence of AmeriCorps<sup>2</sup> there, since they regularly give Prepare with Pedro presentations in schools and were therefore able to help gather data. Due in part to the Covid-19 pandemic, New York and California lacked available sites, so New Hampshire was selected later in the process due to imminent school presentations there. Maryland was initially selected due to the author’s personal connections. After positive reception from the first presentation, two other teachers within the same school requested their students learn from the Prepare with Pedro presentation. Overall, the schools represent a variety of contexts, including suburban and rural locations, and are geographically in both the eastern and western U.S.

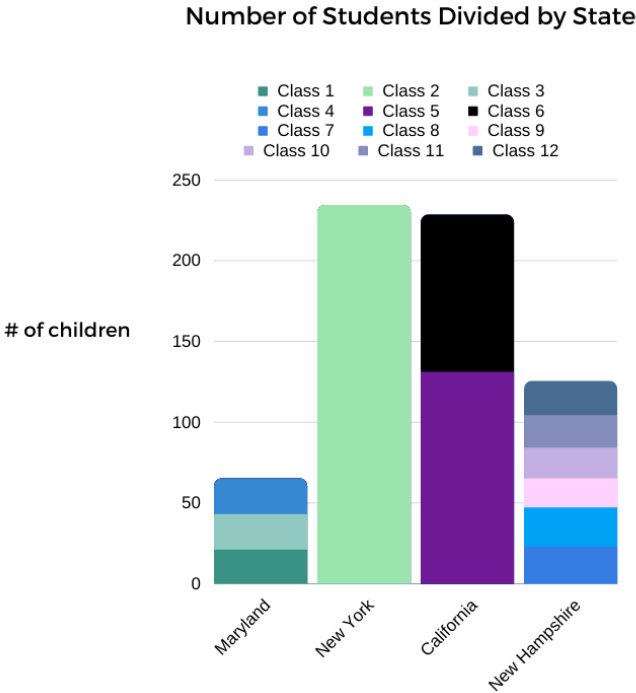


Figure 2. Bar graph showing the division of participating students and classes divided by state and class number.

<sup>2</sup> AmeriCorps is a federal service program that matches volunteers with organizations that address challenges within the U.S. (AmeriCorps, 2022). The American Red Cross is one of these organizations.

Class Number	State	Number of Students	Online or In Person
Class 1	Maryland	21	Online
Class 2	New York	234	In Person
Class 3	Maryland	22	Online
Class 4	Maryland	22	Online
Class 5	California	131	In Person
Class 6	California	97	In Person
Class 7	New Hampshire	23	Online
Class 8	New Hampshire	24	Online
Class 9	New Hampshire	18	Online
Class 10	New Hampshire	19	Online
Class 11	New Hampshire	20	Online
Class 12	New Hampshire	21	Online

Table 1. Table showing classes, their state, the number of students, and if the presentation was online or in person.

The students that were taught as part of the presentations used in this thesis were in kindergarten, 1st grade, or 2nd grade (meaning they were likely between the ages of 5 and 8, although this is dependent on how schools divide grades). In total, 652 students participated in the 12 presentations that are included in this thesis. The presentations for larger groups of students (spanning several grades and classes) were done in person, while presentations for individual classes were done online (e.g., the presenter was on Zoom and students were in a classroom with their teacher). Despite differences in numbers, and that the California and New York presentations were for more than one class, each separate presentation will be referred to as having been given to one class (e.g., New York is Class 2, despite being for 234 students). The breakdown of students and the classes they were in can be seen in Figure 2 and Table 1. The classes are numbered in chronological order (e.g., Class 1 in Maryland was the first presentation done, while Class 12 in New Hampshire was last).

The evaluation study centered around the Prepare with Pedro presentation. Before the presentation, students were orally tested on their fire safety knowledge, then the presentation was given, and finally, the students were again tested on their fire safety knowledge. This set-up was chosen due to previous constraints in how the Red Cross presents this program. The post-presentation test was already part of the presentation, so to avoid confusion and excessive additions to the presentation's length, the pre-presentation test was added to mirror this previously existing test. The Maryland classes also participated in a one-week post-presentation test that asked similar questions to those in the pre- and post-presentation tests. This test was also already part of the program set-up, and usually occurred through a survey sent out to teachers. This was chosen in the hopes that as many classes as possible could be compared; however, responses were only received from the Maryland classes.

### 3.2 Presentations

Youth preparedness education programs are not new, and as previously discussed, there is some research on them and their impact on children, although it is still quite limited (see Chapter 1.3).

To prepare to present Prepare with Pedro and become familiar with the program, the author underwent the training required by the American Red Cross, including completing three online modules and a training over Zoom, during which the Prepare with Pedro

presentation was practiced. All volunteers and employees that present Prepare with Pedro are required to complete these trainings and pass a final test of their program knowledge. In addition, the author read supporting documents that are either available publicly or were accessed using the Red Cross’s internal system. These materials helped the author gain a greater program understanding. The author also practiced the Prepare with Pedro: Home Fire presentation several times. Each presenter is given a script that must be followed during each presentation, so all students receive the same information. However, during each presentation students have specific moments where they can ask questions and provide their own answers, so it is impossible for each presentation to be identical. American Red Cross encourages flexibility but requires the information delivered in each presentation to be the same. This is also the case for the online presentation. It has been adapted so it is easier to present to students at home or school and participating through Zoom, and while the presentation is slightly altered, and a different practice activity occurs, the information presented is identical.

The data in this study was collected through several presentations of Prepare with Pedro: Home Fire in Maryland, California, New York, and New Hampshire. The author, American Red Cross volunteers and employees, and AmeriCorps staff conducted these presentations (see Table 2). The Maryland teachers were contacted through the author’s previous connections, and the schools in California, New York, and New Hampshire were contacted through the Red Cross network. The teachers were given the presentation information beforehand and could suggest any changes in presentation style they believed might make it more accessible to their students.

<b>Class Number</b>	<b>Presenter</b>
Class 1	Author (RC Volunteer)
Class 2	RC State AmeriCorps
Class 3	Author (RC Volunteer)
Class 4	Author (RC Volunteer)
Class 5	RC State AmeriCorps
Class 6	RC State AmeriCorps
Class 7	RC Employee
Class 8	RC Employee
Class 9	RC Employee
Class 10	RC Employee
Class 11	RC Employee
Class 12	RC Employee

Table 2. Table showing presenters for each class.

**3.3 Data Collection**

To capture changes in knowledge, tests (which were done orally and as a group) were used to evaluate students’ knowledge of the material before versus after the presentation. These were used because the Prepare with Pedro presentation already included a section

asking post-presentation questions, so it was easy to add pre-presentation questions without disrupting the flow or making it more difficult for presenters. The questions were asked orally because of the students' age, for ease of the volunteers, and for the sake of anonymity.

At the beginning of each presentation, the students were asked five questions to assess their pre-existing knowledge. These questions were as follows:

1. Should you test the smoke alarms in your home?
2. Should you practice a FIRE DRILL at home?
3. If you see smoke, should you walk slowly through it to get out?
4. Does the smoke alarm make a BEEP, BEEP, BEEP sound?
5. Do you feel prepared for a home fire?

To answer the question, students were asked to either raise their hand/put their thumb up for "yes" or to leave their hand down/put their thumb down for "no". The presenter and any assistants counted and recorded the students' answers.

Then the presentation was given. The presenter read the story and discussed the information, as well as showing the book either as a PowerPoint presentation on screen or holding the physical book. The presenter interacted with the children throughout and asked several questions to help guide their learning. For example, when Pedro learns about smoke alarms, the presenter asks if the students can explain what happens during a school fire drill. This example is used to relate the material to something students are likely already familiar with.

At the end of the presentation, the students were asked six questions to assess their post-presentation knowledge. Five of these questions corresponded to one of the more generic questions asked before the presentation, and the sixth question had the students demonstrate their understanding of the coping skill (deep breathing) presented during Prepare with Pedro. While the teaching of the coping skill is viewed as important, it will not be assessed in this thesis and is therefore not included. The five questions are as follows:

1. Should the smoke alarms be tested in Pedro's home?
2. Should Pedro practice a fire drill?
3. If Pedro sees smoke, should he walk slowly through it to get out?
4. Is BEEP BEEP BEEP the sound a smoke alarm makes?
5. Do you feel more prepared for a home fire now that you've learned along with Pedro?

As with the pre-presentation questions, the students were asked to either raise their hands/put their thumbs up for "yes" or leave their hand down/put their thumb down for "no". The presenter and any assistants counted and recorded the students' answers. This information, as well as the answers from the pre-presentation questions, were then input online so the author could access them. This meant the author did not have any direct connection with nine out of the twelve classes in this study, and only knew the school names, number of participating students, their grades, and their answers as a class to the pre- and post-presentation questions.

After the questions were asked, each student was given a copy of the Prepare with Pedro: Home Fire book to bring home to their household. They were instructed to share what they

learned with their household, practice the skills, and make an emergency plan. The students were also encouraged to reread the book with their adults.

A week or two after the presentation, the American Red Cross sent teachers a survey to check if students remembered information presented in the story. These questions each corresponded with the previous questions, and included:

1. How many students correctly answered with a thumbs-up “should the smoke alarms be tested in Pedro’s home?”
2. How many students correctly answered with a thumbs-up “should Pedro practice a fire drill?”
3. How many students correctly answered with a thumbs-down “if Pedro sees smoke, should he walk slowly through it to get out?”
4. How many students correctly answered with a thumbs-up that BEEP, BEEP, BEEP is the sound a smoke alarm makes?
5. How many students raised their hands when asked if they had shared something they learned from the presentation with family or friends?
6. How many of you made a family meeting spot with your family after the presentation?

Since the questions and survey are part of the Red Cross’s automated system, two of the questions do not directly line up with the questions asked before and after the presentation (questions 5 and 6), and the question regarding feeling prepared (question 5 in the pre- and post-tests) was not asked. However, given that these questions are similar in the information that they ask of students (e.g., sharing with family and taking action by deciding on a family meeting spot are examples of preparedness), questions 5 and 6 from the 1-week post survey and question 5 from the pre- and post-tests were compared. The author only received the answers to the 1-week post-test survey from the Maryland teachers, and therefore only these three classes’ results will be discussed for the results of this test.

Additionally, each of the Maryland school teachers were given a link to an online survey for the students’ adults to complete, which asked questions about the presentation material and regarding their interaction with the material with their student. The teachers distributed this link via email a week after the presentation. The family survey questions asked and their possible answer choices are (in the case of a correct answer, this is bolded):

1. Home fires affect more homes in the U.S. than all other emergencies combined. Have you learned about home fire preparedness before? (Yes/No)
2. Did you and your child discuss the activity and go through Pedro's Safety Checklist? (Yes, activity/Yes, checklist/Yes, both/No)
3. Did you and your household make any changes after learning about fire safety? (Checked our smoke alarms/Made an emergency plan/Practiced our fire drill/Made an emergency supply kit)
4. In the book, Pedro and Mia learn about smoke alarms. How often should you test your smoke alarm? (Yearly/Bimonthly/**Monthly**)
5. Pedro and Mia also learn about smoke. If you see smoke, what should you do? (Stay high and fly/**Get low and go**/Get out in 2 minutes)
6. Thank you for your responses and for learning about fire safety preparedness with your child. Do you have anything to add?

While the family survey was sent out to all of the Maryland students' families (a total of 65 students), only 15 adults answered the family survey (see Figure 3). Eight of the survey respondents did not answer all of the questions; however, given the overall low response rate, these survey answers, though incomplete, will still be considered in the results, and this lack of response discussed.

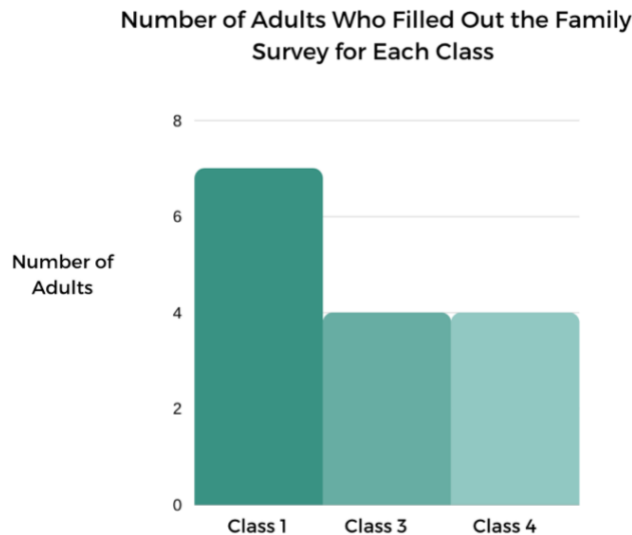


Figure 3. Bar graph showing the number of adults who filled out the family survey for each class in Maryland.

### 3.4 Data Analysis

The statistical data from the pre-tests and post-tests was organized into a Google Sheets spreadsheet and the numbers were converted into percentages so they could be compared. Then, this statistical data was analyzed using the statistical software SPSS. With SPSS, a standard one-way analysis of variance (ANOVA) test was performed. The purpose of this test is to see if there is a difference in two similar samples' means and if this difference is statistically significant (i.e., the p-value is less than 5 percent), then it is not purely by chance. In this paper, the pre-tests were compared to the post-tests. Given the lack of responses for the 1-week post-test, these were not included in the statistical analysis.

The Prepare with Pedro test data was also analyzed by being converted into graphs which allowed for the information to be viewed more easily and compared. The data was compared graphically both on a class basis (e.g., pre-test versus post-test for each class) and on an overall basis.

The family survey data was also converted into graphs to allow for the information to be viewed and compared. Given the lack of respondents, the data was only compared on an overall basis and no distinction was made based on which class the family belonged to.

### 3.5 Limitations of the Data

As mentioned in Chapter 1.5, the collection of data for this thesis was partially encumbered by school restrictions due to the Covid-19 pandemic. While the Prepare with Pedro presentations are usually held in classrooms in person, the Maryland and New Hampshire presentations were held via the video presentation platform Zoom and children were at times wearing face masks. This meant the learning environment was not as interactive

as it might have been. The presentation was adapted (e.g., a PowerPoint presentation was used to present the book) and rather than the typical practice activity (e.g., using a bedsheet to practice getting low if there is smoke), a discussion was held instead.

The pre-test and post-test data is also limited by the nature of children. While the children are meant to close their eyes while answering the pre-test and post-test questions, many had their eyes open, and could have been swayed by their peers' answer choices.

A lack of response also impacted the family survey data as well as the one-week post-presentation teacher survey. While lack of response was considered a potential issue when deciding to do a survey for adults, the benefits of this perspective from the students' adults outweighed this issue.

While it would have been ideal to send out a survey to the families of all students in the study (rather than only those in Maryland) or to receive information about all the students' knowledge 1 or 2 weeks after the study — given a lack of access to this information, lack of response, and lack of time, this was not possible for all classes. Research that includes this in the future could give greater insights into the longer-term impacts of youth preparedness programs, and the perspective of their adults.



**4. Results**

In this chapter, the primary data findings from the Prepare with Pedro presentations in Maryland, New Hampshire, California, and New York (pre-test, post-test, 1 week post-test, and family survey) are presented.

This chapter is divided into three sections, each focused on one of the paper’s three research questions. The first part examines if the students learned from the Prepare with Pedro presentation, taking an overall approach by focusing on the individual classes as well as all students, but not looking at any specific question in detail. The second section focuses on examining students’ knowledge of specific topics, and what material they did not seem to understand. This section dives deeper into the individual questions, looking at them both from an overall perspective, as well as from the perspective of each class. Finally, the third section examines the family survey and its responses.

**4.1 Did the students’ knowledge of home fires increase after the Prepare with Pedro program?**

To answer this question, the averaged results of the Prepare with Pedro pre-tests, post-tests, and 1-week post-tests must be examined. As seen in Table 3, there was a large spread of percentages before the presentation. A full table of the results can be viewed in Appendix B. There was a 52 percent difference between the class with the lowest percentage of correct answers (31 percent of Class 3), and the highest (83 percent of Class 2).<sup>3</sup> The spread of percent of students answering correctly after the presentation was much smaller, ranging only 22 percent, with the lowest being 75 percent (Class 4), and the highest being 97 percent (Class 5 and Class 12).

Classes	Pre-test Average	Post-test Average	1-week Post-test Average
Class 1	0.55	0.88	0.92
Class 2	0.83	0.95	
Class 3	0.31	0.85	0.95
Class 4	0.41	0.75	0.72
Class 5	0.74	0.97	
Class 6	0.72	0.86	
Class 7	0.68	0.95	
Class 8	0.56	0.93	
Class 9	0.66	0.91	
Class 10	0.49	0.91	
Class 11	0.52	0.91	
Class 12	0.44	0.97	
<b>Total Average</b>	<b>0.58</b>	<b>0.90</b>	<b>0.86</b>

Table 3. Table of average scores for each class on the pre-test, post-test, and 1-week post-test, as well as the overall average for each of these.

<sup>3</sup> Question 5 did not have a “correct” answer, but rather affirmative/negative answer choices with the affirmative answer being the aim. For conciseness in comparing with other choices, “correct” also means “affirmative” for this question.

When comparing the average scores pre- and post-presentation, all the classes increased in the average percent of correct answers. The average total increase was about 30 percent. Some classes saw smaller increases (e.g., Class 2 and Class 6 only had 12 percent and 14 percent increases, respectively), while others saw an over 50 percent increase in the number of correct answers (e.g., Class 3 and Class 12 increased 54 percent and 53 percent, respectively). Most of the classes, however, had an increase between 20 and 40 percent. This can also be viewed graphically in Figure 4, which uses a bar graph to illustrate the differences between the average scores for each class before and after the presentation.

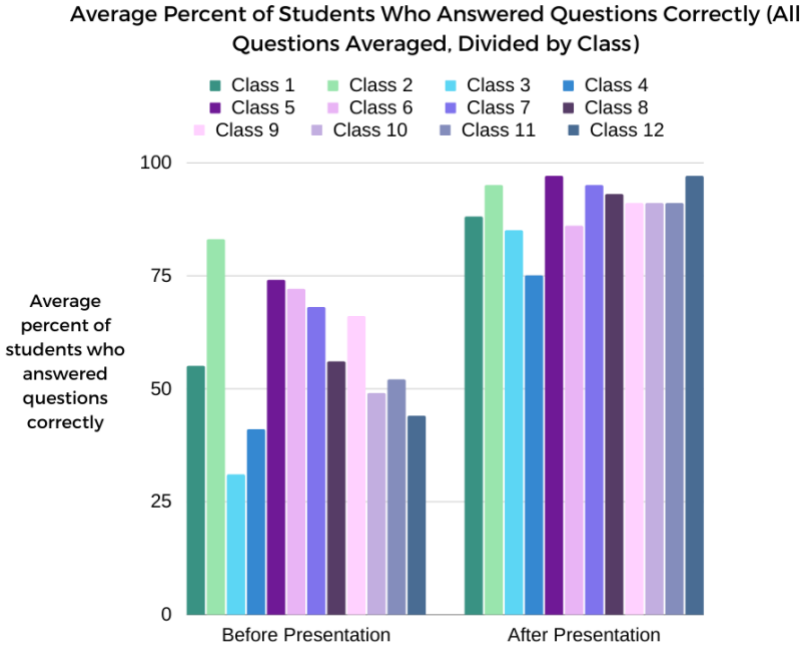


Figure 4. Bar graph showing the differences between the pre-test and post-test averages for each of the classes.

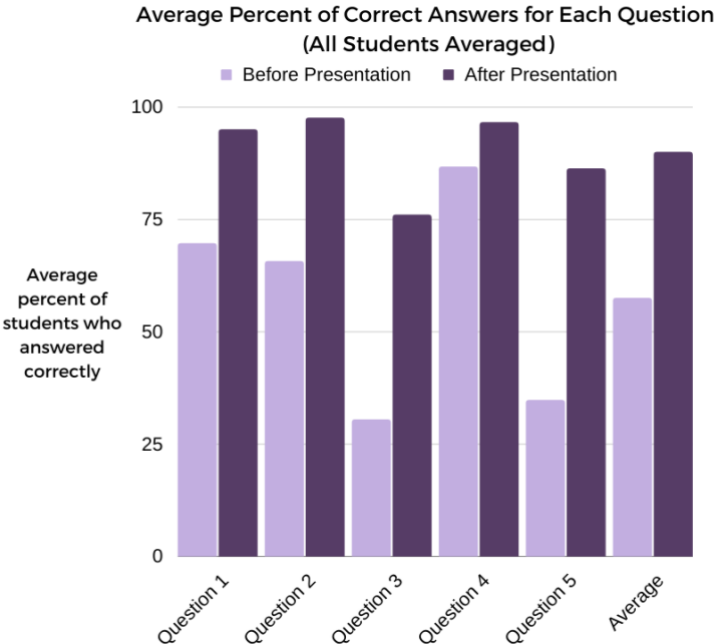


Figure 5. Bar graph showing the differences between the pre-test and post-test averages for each of the questions in the Prepare with Pedro program.

Not only was there an increase for each class, but each question also saw an increase in correct answers between the pre-test and post-test (as can be seen in Figure 5). The question with the biggest increase was question 5, with a 52 percent increase between the pre-test and post-test. This question asked students about their feelings of preparedness. Question 3 also saw a similarly large increase after the presentation, with a difference of 45 percent. This question asked students if they should move slowly if they see smoke. The question with the smallest increase was question 4, with only a 10 percent increase after the presentation. This question asked students if the smoke alarm makes a loud “BEEP BEEP BEEP” sound. The responses to individual questions will be discussed in more detail in Chapter 4.2.

This increase in correct answers for each of the questions can also be illustrated through the one-way ANOVA test, which was done with SPSS (as is explained in Chapter 3.4). Doing a one-way ANOVA test resulted in the significance figures seen in Table 4. The full results of this test can be viewed in Appendix C. Since all but one of the questions received a p-value of lower than 5 percent, the results of this one-way ANOVA indicate that the differences in means of the pre-tests and post-tests for each of the questions (other than Question 4) is not by chance.

Questions	Significance
Question 1	.003
Question 2	<.001
Question 3	<.001
Question 4	.113
Question 5	<.001
Average	<.001

Table 4. Table showing the results of SPSS one-way ANOVA test.

This can further be seen by the scores received by the Maryland classes (Class 1, Class 3, and Class 4), who completed a 1-week post-test in addition to the pre-test and post-test. As is visible in Figure 6, not only was there an increase in test scores after the presentation, but for all three classes, these scores remained high after 1 week. For both Class 1 and Class 3, the scores even increased after 1 week. When delving into each class and question individually, it is clear this was not the case for every question, but as can be seen in Figures 7, 8, and 9, and will be discussed in the following section, the increase was only for specific questions. As is visible in Figure 7, Class 1 had consistently high scores after 1 week, with all of the scores staying well above 75 percent of the class answering correctly/positively. For the questions where there was a decrease in scores, only 10 percent or less of students in Class 1 answered incorrectly. As can be seen in Figure 8, Class 3 is similar in their results 1 week after the presentation. Most of the questions retained an over 75 percent correct answer rate, other than Question 5, which dipped to 73 percent of students answering positively. Compared to Class 1, Class 3 had three questions where more students answered correctly 1 week after the presentation than right afterwards. Figure 9 shows the results of the three tests for Class 4. Class 4 had several increases in correct answer choices, but also a significant dip for Question 5, which returned to the same level as before the presentation. While both Class 1 and Class 3 showed a slight improvement after 1 week, Class 4 showed a minor dip in scores, likely due

to the results of Question 5. However, overall, the results from the three 1-week post-tests show the increases in student knowledge remain after 1 week.

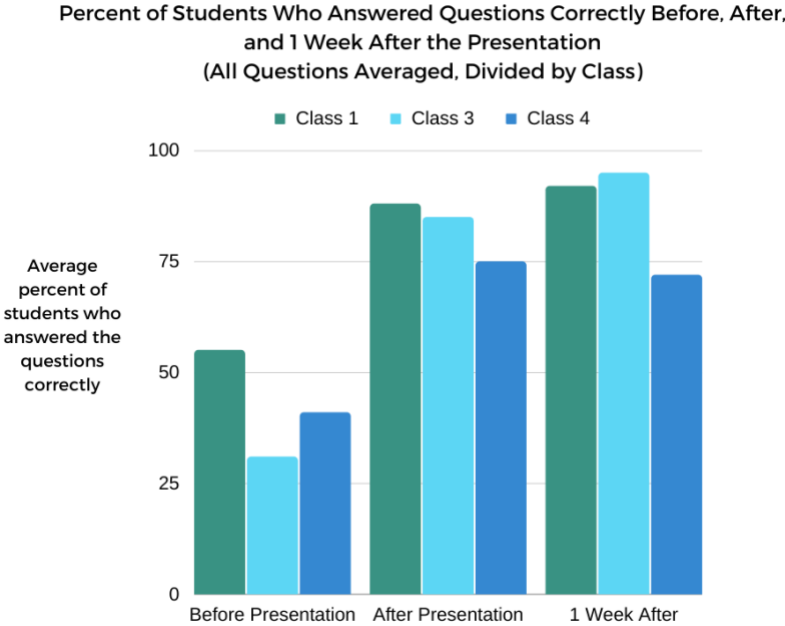


Figure 6. Bar graph showing the average scores for Classes 1, 3, and 4 for the pre-test, post-test, and 1-week post-test.

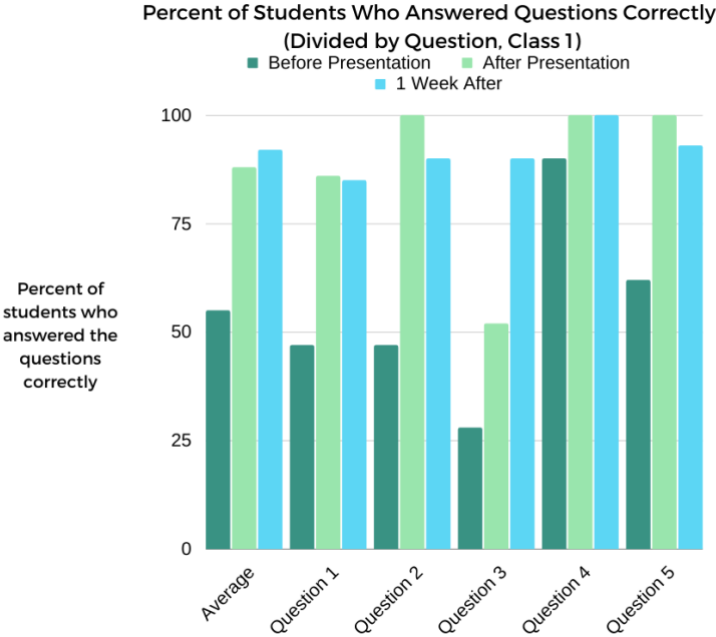


Figure 7. A bar graph comparing the scores of students in Class 1 for each question as well as overall, before, after, and 1 week after the Prepare with Pedro presentation.

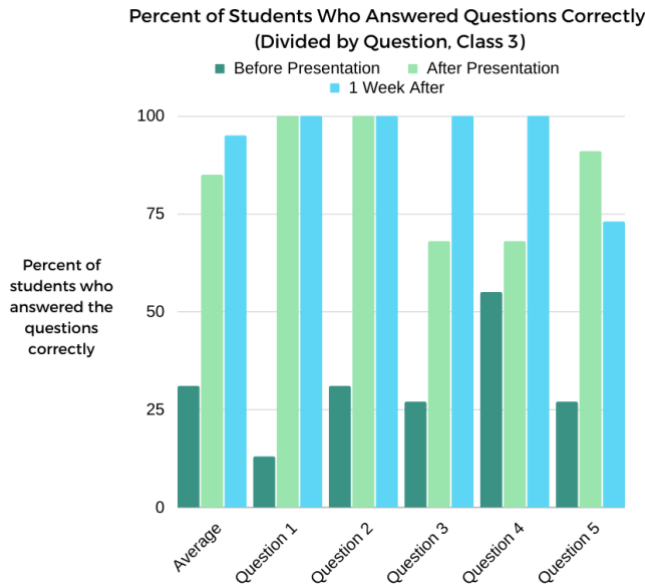


Figure 8. A bar graph comparing the scores of students in Class 3 for each question as well as overall, before, after, and 1 week after the Prepare with Pedro presentation.

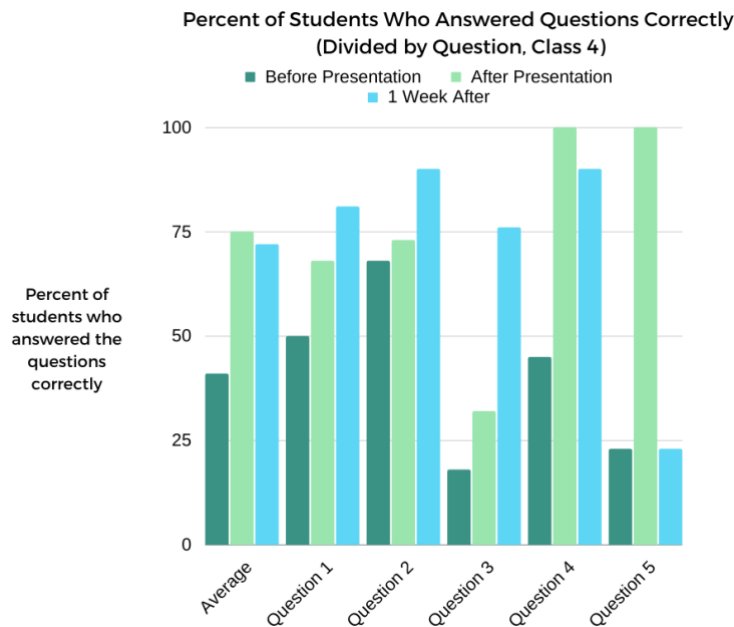


Figure 9. A bar graph comparing the scores of students in Class 4 for each question as well as overall, before, after, and 1 week after the Prepare with Pedro presentation.

While the previous results have shown each of the classes had an increase in scores post-presentation, given that some presentations were done in person and at an assembly, and some were done for individual classes and online, these also will be compared. In Figure 10, it is evident the in-person/assembly classes had a higher starting score, as well as a higher score after the presentation, but there was also less of an increase (only 17 percent) between the two. However, virtual classes saw an increase of 36 percent. When looking at individual questions, the same holds true. The largest increase for in-person classes was for question 3 (with a 32 percent increase), while many of the other questions only had around a 10 percent increase (questions 1, 2, and 4). Comparatively, three of the questions (questions 2, 3, and 5) saw a 40 percent or greater increase for virtual classes after the presentation. Possible reasons for this will be discussed in Chapter 5.1.

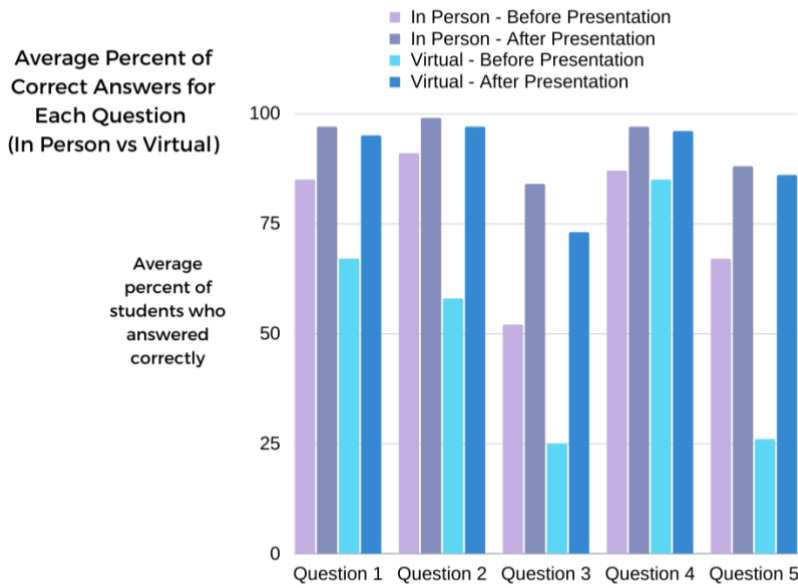


Figure 10. Bar graph showing the differences in average percent of correct answers for each question, divided by in-person and virtual presentations, as well as before and after the presentation

Overall, given the results of the ANOVA test, and the visible increase in scores post-presentation, which continue one week after the presentation, the author finds in the classes examined that the Prepare with Pedro program led to an improvement in students' knowledge of the home fire safety material presented.

#### 4.2. In which areas does student knowledge increase and not increase?

This question also focuses specifically on the results of the Prepare with Pedro pre-tests, post-tests, and the 1-week post-test. However, it looks at individual questions as indicative of knowledge about a specific topic, rather than of increases in knowledge in general.

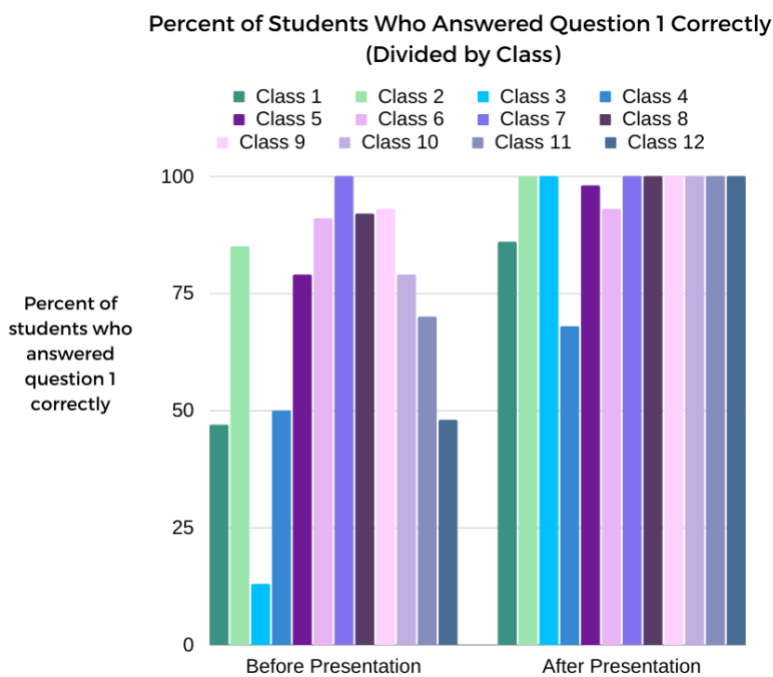


Figure 11. Bar graph showing the percent of students who answered Question 1 correctly before versus after the presentation, divided by class.

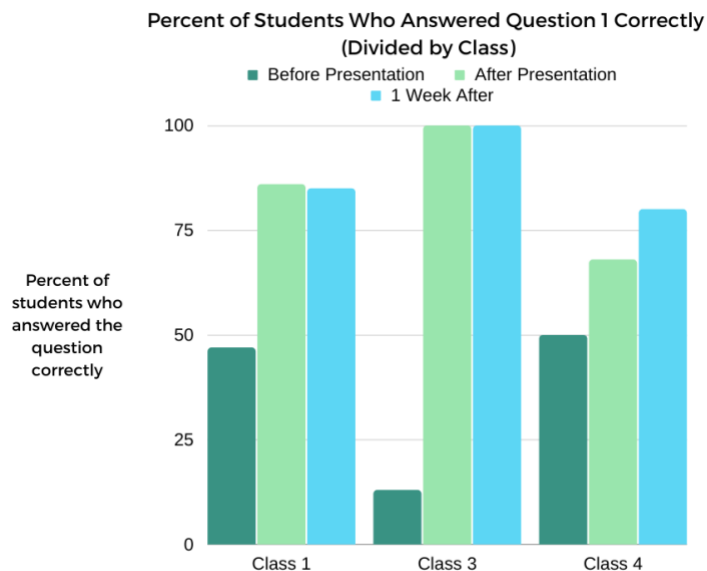


Figure 12. Bar graph showing the percent of Maryland students who answered Question 1 correctly, before, after, and 1 week after the presentation.

#### **4.2.1 Question 1**

Question 1 focused on whether smoke alarms need to be tested. As is shown in Figure 11, most classes did quite well on Question 1 post-presentation. All but one class had 75 percent or more of students answering correctly after the presentation. In fact, eight of the twelve classes had 100 percent of students answer the question correctly. One class, Class 3, even increased from 13 percent of students answering correctly pre-presentation to 100 percent post-presentation. Overall, the average score for Question 1 was 70 percent before the presentation, and 95 percent after the test. As can be seen in Figure 12, Question 1 also did well when considering the 1-week post-test the Maryland classes (Class 1, Class 3, and Class 4) did. Based on the percentages of correct answers, students seemed to remember the correct answer after 1 week. In the case of Class 4, some who had previously gotten the question wrong got it right 1 week afterwards. Potential explanations will be discussed in Chapter 5.1.3. As discussed in the previous section, Question 1 is one of the questions where the differences in scores between the pre-test and the post-test are statistically significant and not due to chance. Based on the statistical significance found in the one-way ANOVA test (Question 1 had a statistical significance score of .003), and the overall high percentages of correct answers for Question 1, the author finds smoke alarms to be a topic that is taught well by the program. However, given that seven of the twelve classes were at or above 75 percent correct answers before the presentation, it is clear this is a topic that some students have some knowledge of before engaging in the program.

#### **4.2.2 Question 2**

Question 2 focused on whether a fire drill should be practiced at home. Figure 13 illustrates the percentage of students who answered the question correctly pre- versus post-presentation. While two classes had 100 percent of students answer the question correctly pre-presentation, half of the classes only had 50 percent or less answer the question correctly pre-presentation. However, all but one class had 99 percent or more students answer the question

correctly post-presentation. Class 4 only had one more student who answered correctly when comparing the pre-test and the post-test results. Overall, the average percent of students who got Question 2 correctly in the pre-test was 66 percent, while an average of 98 percent of the students got it correct during the post-test. Out of the 652 students who participated in the program as part of this paper, only 8 students did not answer this question correctly. As is visible in Figure 14, the Maryland students did well in the 1-week post-test for Question 2. While students in Class 1 did slightly worse than they had directly after learning the material, 90 percent got the question correct. Similarly to Question 1, students in Class 4 did better on Question 2 in the 1-week post-test than right after the presentation. Question 2 did well in the one-way ANOVA test, with a significance score of less than 0.001, meaning it is likely this difference is not due to random chance. Due to both the good significance score, and the low number who got this question incorrect, the author finds home fire drills to be a topic taught well by the Prepare with Pedro program.

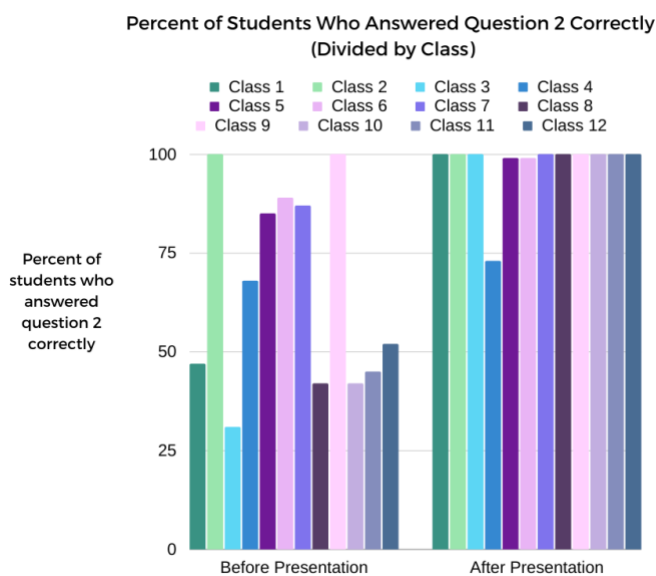


Figure 13. Bar graph showing the percent of students who answered Question 2 correctly before versus after the presentation, divided by class.

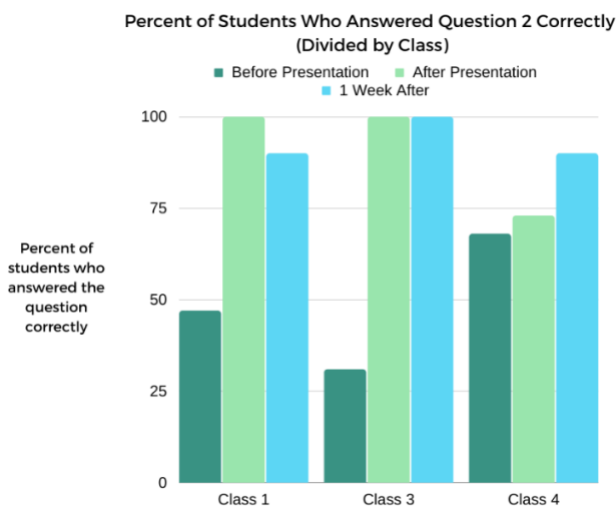


Figure 14. Bar graph showing the percent of Maryland students who answered Question 2 correctly, before, after, and 1 week after the presentation.



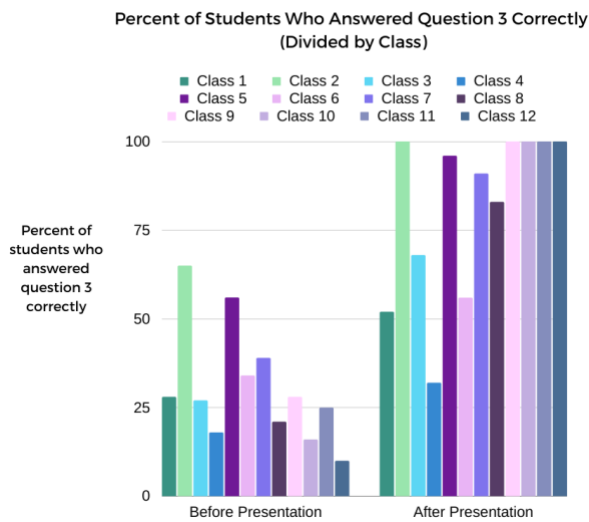


Figure 15. Bar graph showing the percent of students who answered Question 3 correctly before versus after the presentation, divided by class.

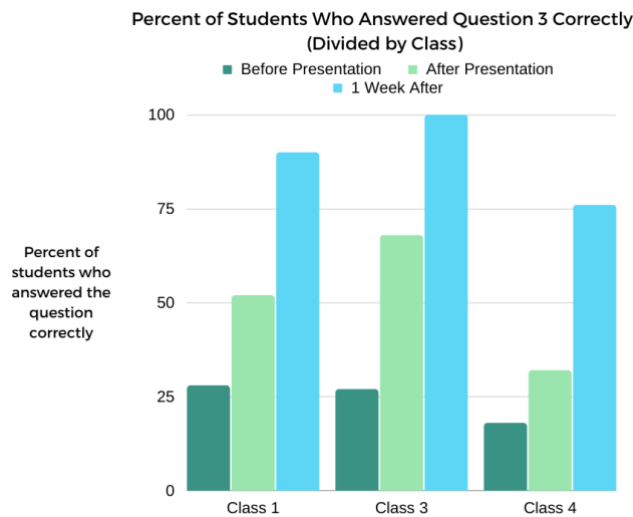


Figure 16. Bar graph showing the percent of Maryland students who answered Question 3 correctly, before, after, and 1 week after the presentation.

### 4.2.3 Question 3

Question 3 concentrated on what students should do if they see smoke and whether they should move quickly or slowly. Unlike the previous questions, the answer to this question (if Pedro sees smoke, should he walk slowly through it to get out?) was “no”. Around 30 percent of students answered Question 3 correctly pre- presentation, and around 75 percent answered correctly afterward. As can be seen in Figure 15, four classes had 100 percent of their students answer the question correctly, and eight of the twelve classes had 75 percent or more of their students answer this question correctly. However, compared to the high scores of Questions 1 and 2, Question 3 had a more varied spread of students answering correctly. This was the question that had the second greatest increase in correct answers, and also had an ANOVA significance score of less than 0.001. Based on this, the author states that the Prepare with Pedro program teaches evacuation well. This is supported by the responses to the 1-week post-survey that the Maryland classes took, as can be seen in Figure 16. All Maryland classes had greater percentages answering this question correctly 1 week after than right after the presentation. As will be discussed in Chapter 5.1.2, the author feels that this question’s

answers may not be recorded entirely accurately. In recording their answers, the presenters for Class 2 left a comment regarding this question, stating “On Pre-Quiz, question #3 — we feel the stats on this question were altered because in a school setting, students are taught to walk slowly in a single file line during school fire drills.”

#### 4.2.4 Question 4

Question 4 focused on the sound a smoke alarm makes (“BEEP BEEP BEEP”). Many students did well on this question before the presentation, as well as afterward (see Figure 17). Overall, 87 percent of students answered this question correctly pre-presentation, and 97 percent answered correctly post-presentation. In six classes, all students answered the question correctly during the pre-test, increasing to nine classes answering completely correctly afterwards. The lowest classroom percentage that answered correctly was 68 percent in Class 3. There was only an increase of 10 percent for Question 4, and only 54 more students answered correctly afterward compared to before. Only 16 students answered this question incorrectly post-presentation. When doing the 1-week post-test, all students in Classes 1 and 3 continued to answer this question correctly. Figure 18 shows the slight decrease in correct answers after a week in Class 4, but only 2 students answered incorrectly. Despite the many correct answers, interestingly, this question did not have the most correct answers (as previously mentioned, this was Question 2). However, despite its high percentage of correct answers, due to the high number of students who answered correctly pre-presentation, the ANOVA significance score was 0.113, which is greater than 0.05, and therefore it is possible this difference is due to chance and not due to Prepare with Pedro. Given the high percentage of students that answered this question correctly before the presentation, it is likely that many students already know this information. This will be discussed further in Chapter 5.1.3.

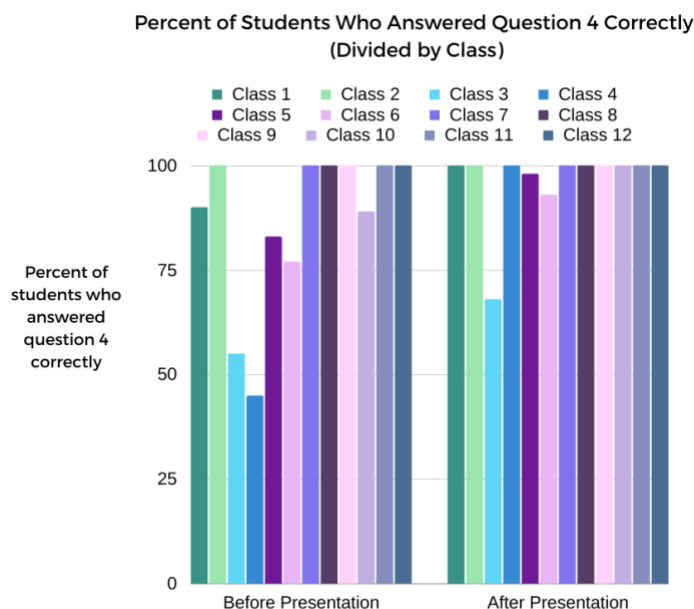


Figure 17. Bar graph showing the percent of students who answered Question 4 correctly before versus after the presentation, divided by class.

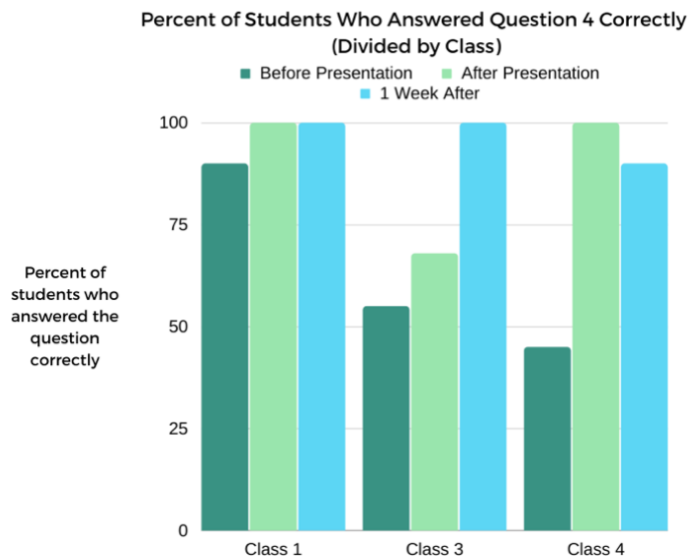


Figure 18. Bar graph showing the percent of Maryland students who answered Question 4 correctly, before, after, and 1 week after the presentation

#### 4.2.5 Question 5

Question 5 focuses on feelings of preparedness and asks if students feel prepared for a home fire if it were to occur. For this question, there was no correct answer. Answering “no” is not wrong, but rather indicates that Prepare with Pedro has room for improvement in helping specific students feel prepared. Before the presentation, an average of 35 percent of students answered they felt prepared, while 86 percent answered affirmatively after the presentation. As shown in Figure 19, only two classes had 100 percent of their students answer “yes”. Ten of the twelve classes had more than 75 percent of students answer affirmatively to the question after the presentation. The highest percent of students in a class that did not feel prepared was 28 percent (i.e., 72 percent felt prepared). In doing the 1-week post-survey, the same question was not asked, but rather two questions relating to preparedness. Figure 20 shows that while there was a slight dip for all classes, both Class 1 and Class 3 retained fairly high percentages of students that practiced elements of preparedness. However, interestingly, Class 4 dipped to the same level it started with before the presentation. Question 5 had the largest difference between the pre-test and post-test answers, with an increase of 52 percent between the two. This, as well as the low p-value found in the one-way ANOVA test (the p-value was lower than 0.001), leads the author to believe the program leaves students feeling more prepared for a home fire than they felt before being taught the program.

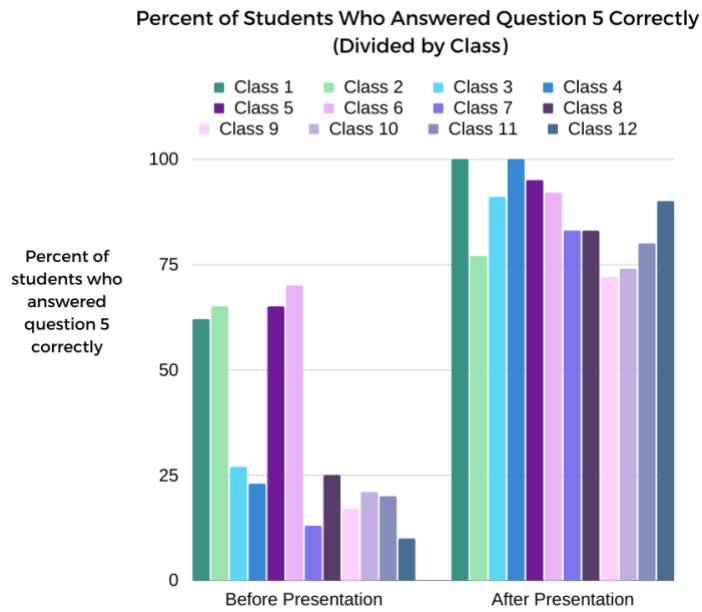


Figure 19. Bar graph showing the percent of students who answered Question 5 correctly before versus after the presentation, divided by class.

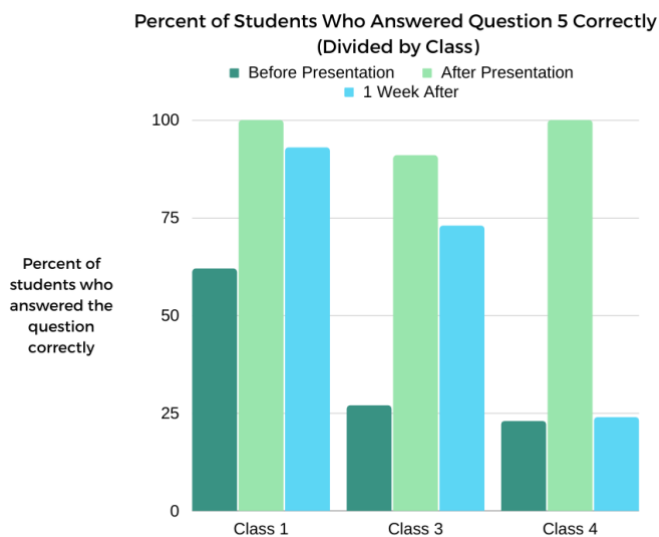


Figure 20. Bar graph showing the percent of Maryland students who answered Question 5 correctly, before, after, and 1 week after the presentation

Overall, based on these findings the author believes four out of the five questions are ones where more students had knowledge of the material after the Prepare with Pedro program. However, Question 4 is a topic students may have previous knowledge of or improvements were due to chance. This will be further discussed in Chapter 5.

### 4.3 What knowledge do the students' adults report having?

This question focuses on results of the family survey, which the Maryland teachers sent out to the students' families in Classes 1, 3, and 4. There were limited responses to this survey, as previously illustrated in Figure 3 in Chapter 3.2. Only 15 adults answered the survey (and eight of these responses were incomplete). Generalizations cannot be made from the responses that were submitted. However, the responses will still be presented and discussed. The full results of the family survey can be found in Appendix D.

**4.3.1 Question 1**

The first question in the family survey asked adults if they had previously learned about home fires. As Figure 21 shows, nine of the 15 respondents had previously learned about home fire preparedness, three had not, and three did not answer the question.

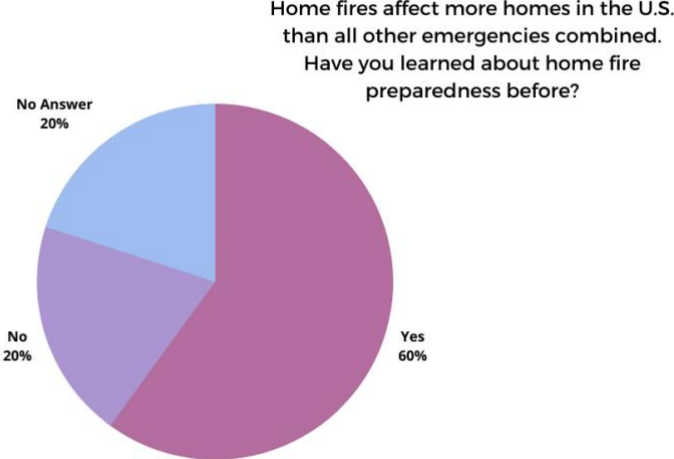


Figure 21. A pie chart showing the results of Question 1 in the Family Survey.

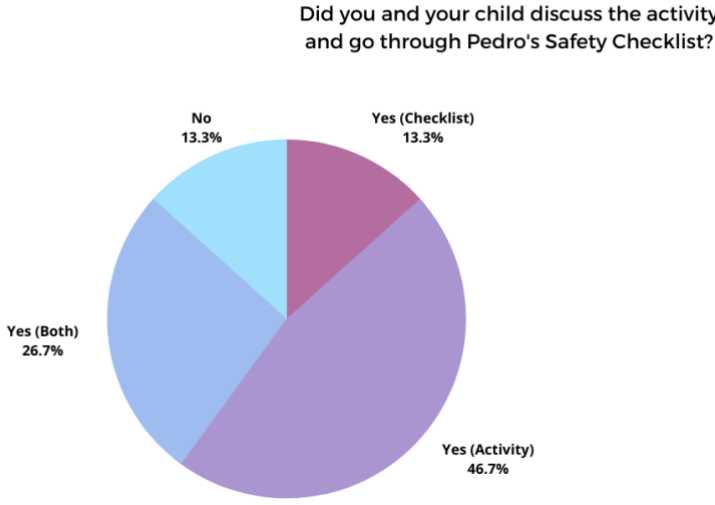


Figure 22. A pie chart showing the results of Question 2 in the Family Survey.

**4.3.2 Question 2**

The second question asked adults how they interacted with the Prepare with Pedro material. The answer choices included the activity as a whole, or the Prepare with Pedro checklist (see Appendix E) on the back of the book provided to all students. All adults answered this question. As shown in Figure 22, seven of the adults only discussed the activity with their student, two discussed only the checklist, and four discussed both the checklist and the activity. Two adults did not discuss any of the activities with their student.

### 4.3.3 Question 3

Question 3 asked adults if they and their household made any changes after learning about fire safety. The answer choices were presented as a checklist, allowing adults to choose none, any, or all of the choices (see Figure 23). Five adults chose none of the answers, perhaps indicating they did not make any changes, or they did not wish to answer. Five adults indicated they made an emergency plan, four practiced their fire drill, four tested their smoke alarm(s), and four made a family emergency supply kit. Of these, two adults indicated their households practiced and implemented all of the changes. In households that only selected one of the changes, they were most likely to have made an emergency plan (three households).

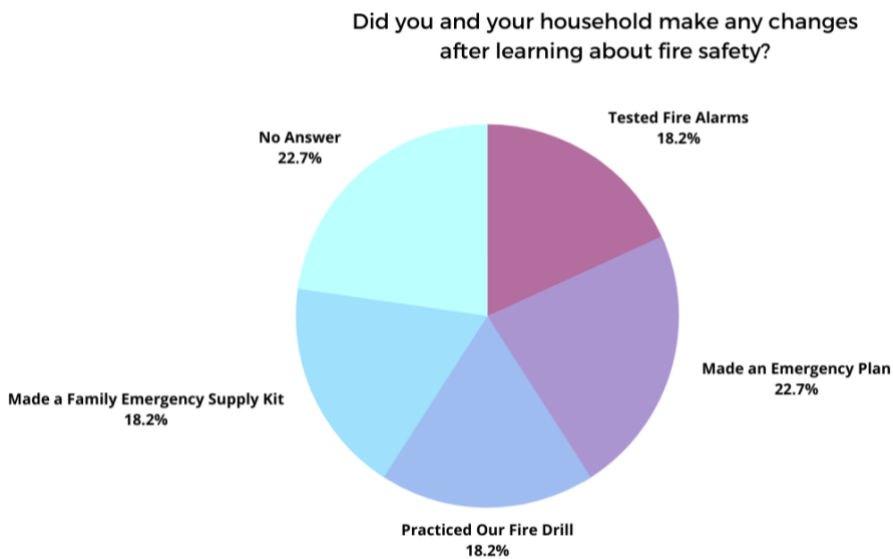


Figure 23. A pie chart showing the results of Question 3 in the Family Survey.

### 4.3.4 Question 4

Question 4 tested if adults had read through or discussed the materials with their students, asking how often smoke alarms should be tested. All of the adults answered this question. The correct answer for this question was “monthly”, which 12 of the 15 adults selected (see Figure 24). One chose “bimonthly” and two chose “yearly”.

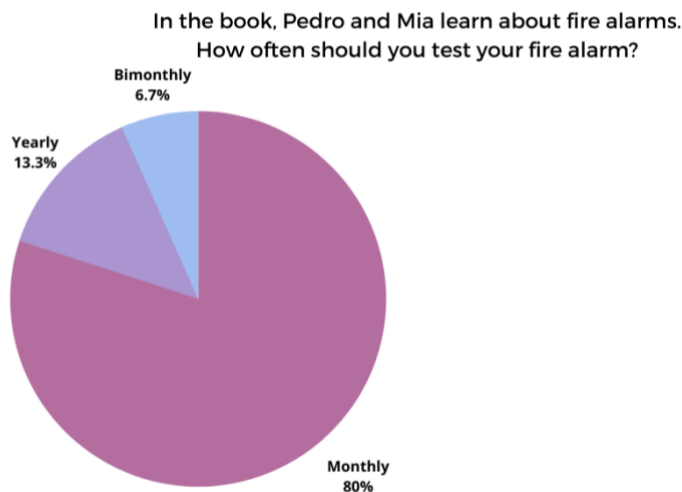


Figure 24. A pie chart showing the results of Question 4 in the Family Survey. The correct answer is “monthly”.

### **4.3.5 Question 5**

Question 5, shown in Figure 25, focused on what to do if there is smoke during a home fire. The correct answer was to “get low and go.” Another answer, “get out in 2 minutes,” is also correct but not the response the author (or the American Red Cross) prefers. While it could indicate previous fire safety knowledge, it shows the adult has not thoroughly read the Prepare with Pedro materials. “Stay high and fly” was not correct. Eleven adults answered correctly with “get low and go”, while two selected “get out in 2 minutes”. One person selected “stay high and fly” and one person did not answer.

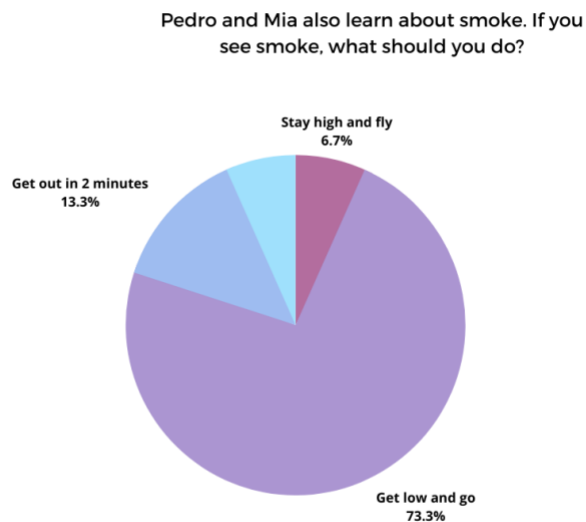


Figure 25. A pie chart showing the results of Question 5 in the Family Survey. The correct answer is “get low and go”.

### **4.3.6 Comments and Comparison of Respondents**

The family survey also had a field for comments. Two responses were received. One adult said, “My child learn[ed] how to prepare for emergencies. Thank you.” The other said, “Thank you for creating this! We had a great family discussion with our 7,5 and 3-year-old.”

Of the adults that incorrectly answered the two questions that had correct answers, all either said they had never learned about fire safety before or did not answer the question asking this. However, several others that said they had never learned about fire safety did answer the questions correctly. The two adults that said they neither discussed the activity nor the checklist with their student both did not answer Question 3, and so it is possible they made no changes to their household. However, both answered Question 5 with “get low and go” correctly, and one answered the smoke alarm testing question correctly.

## 5. Discussion

This section discusses the thesis results as they relate to previous research on disasters and children. This chapter is split into two sections. The first interprets the results in the context of improving children's knowledge of disaster preparedness measures, specifically for fire safety. The second discusses the family survey results in the context of increasing adults' knowledge of home fire safety measures.

### ***5.1 Students' Knowledge of Home Fire Safety Material***

The first research question this paper asked was: Does the students' knowledge of home fires increase after the Prepare with Pedro program? As was concluded in Chapter 4.1, based on the average increase of 30 percent and the overall significance found with the ANOVA test, the Prepare with Pedro presentations led to a general increase in the students' knowledge of the home fire safety material. The results also showed that certain topics had larger increases of knowledge, while others were perhaps topics students already had knowledge about. This relates to the second research question: In which areas does student knowledge increase and not increase? In relation to the literature on this topic and the results, this section discusses why this overall increase might occur, why these topics are important, and the possible impact this knowledge has on students involved in the program.

#### **5.1.1 Overall**

Based on the significant increase in correct answer choices, it is clear Prepare with Pedro had an impact on the students, and likely a positive one. Based on the increase in correct answers, it could be surmised that the way the information is being taught resonated with the children. Prepare with Pedro's overall success could be related to several factors related to its design including adapting to fit the needs of its young audience, meeting U.S. educational standards, and following guidelines for teaching fire safety.

While some might assume that preparedness programs are guaranteed to lead to a positive impact and increase in knowledge for their participants, and most do, this is not always true. A study focused on ShakeOut, a 2012 earthquake and tsunami preparedness program in Washington state, found that after participation in the program while partakers had high levels of protective action knowledge, scenario-based knowledge application was low (Johnson et al., 2014a: 347). It is therefore important to investigate more closely what knowledge increases, and why this increase might occur.

Prepare with Pedro is similar to other preparedness programs and tools for this age group in using storytelling to impart information, before giving actionable suggestions for children and their adults (American Red Cross, 2017b). A book entitled *No Dragons for Tea: Fire Safety for Kids (and Dragons)* does the same, and similarly, advises making an emergency escape plan, practicing a fire drill, and hearing what your smoke alarm sounds like, among other suggestions (Pendziwol, 1999). The London Fire Brigade has a book starring "Noisy" the smoke alarm, who informs children about smoke alarms and what to do when they go off (London Fire Brigade, 2020). Storytelling is a critical part of Prepare with Pedro. It differentiates it from other Red Cross youth preparedness programs and makes it accessible to such young learners.



Prepare with Pedro is also made accessible to kindergarten, 1st, and 2nd graders because it is built on national education standards<sup>4</sup> for these grades and for different subjects (American Red Cross, 2020). It aligns with national education standards and requirements for health, language arts, and science (American Red Cross, 2020), and can be adapted to fit younger audiences in kindergarten, as well as older 2nd grade audiences. This means teachers can feel comfortable that the program not only educates their students on life-saving information, but additionally teaches them important skills such as listening comprehension and demonstrating healthy ways to express feelings, which are part of the curricula of these grades/subjects (American Red Cross, 2020).

While there is a lack of guidelines for developing new fire safety education programs for children, or for evaluating existing programs, Pooley et al. have evaluated programs to develop 25 evidence-based practices that unite effective fire safety programs (2020: 35). Prepare with Pedro was in line with many of these practices, including having a CCDRR approach, focusing on behavior, and using an “instruction, modelling, rehearsal, and feedback” approach needed to teach fire safety to children (Pooley et al., 2020: 36). While Prepare with Pedro includes all four of these in its instruction, further repetition is likely needed to ensure the skills and knowledge presented are actually learned. This would be achieved through repetition of material at home or by teachers and could lead to longer term knowledge retention.

While some of the topics may have been unfamiliar at the beginning of the presentation, the information was taught in a way that allows for the children to interact with it, and by the end, it seems they had a greater knowledge of it.

### **5.1.2 Fire Drills and Smoke**

As previously mentioned, home fire drills are essential to ensure all household members are able to safely exit the home in under 2 minutes (U.S. Department of Homeland Security, 2021b). The goal of a fire drill is “to have the proper actions be an automatic response whenever smoke alarms sound” (JBER Fire & Emergency Services, 2019). Prepare with Pedro aims to equip students with knowledge about the importance of creating an emergency plan and practicing a fire drill. This is tested with Question 2, which, as shown in Chapter 4.2.2, had a very large percentage of students answering correctly. Based on this, it is clear the importance of fire drills was emphasized well during the presentation.

As discussed, about two-thirds of the students answered the question correctly in the pre-test, meaning that some students already had knowledge about this topic. While requirements vary based on states and localities, since the 1960s, schools in the U.S. have been required to conduct fire drills several times throughout the year (Hull, 2011: 447-448). California, for example, requires that elementary schools test their smoke alarms at least once a month (California Code of Regulations, 2011). This means it is almost certain that all the students who participated in Prepare with Pedro for this thesis had previously participated in a school fire drill. This is perhaps why a high percentage of students answered this question correctly

---

<sup>4</sup> There is no single U.S. national education standard, as these vary based on state. However, Prepare with Pedro is built on the “Joint Committee on National Health Education Standards (2007), the Common Core State Standards for English Language Arts (2020), and the Next Generation Science Standards (2013), which are used throughout the U.S.

initially, connecting the importance of a school fire drill to the importance of a home one. However, while more important due to the higher likelihood of a home fire, home fire drills are less likely to occur than school fire drills, and a 2011 study found 72 percent of U.S. parents with children under the age of 12 had never practiced a fire drill with their family (Liberty Mutual Insurance, 2012). The same study found that while 90 percent of children who had practiced their escape plan knew how to get to their designated meeting spot during a fire, only 46 percent of those who had never practiced could do the same (Liberty Mutual Insurance, 2012). It is therefore essential that the importance of home fire drills continues to be emphasized in teaching children and households.

Practice is also essential because of the dangers of smoke during a home fire. Smoke can make your home completely dark within 4 minutes (San Francisco Fire Department, n.d.) and is the cause of most deaths during home fires (National Fire Protection Association, n.d.). Question 3, which focused on smoke, asks children if they should exit slowly. Unlike the other questions, this requires a negative answer, as the answer should be that one needs to exit as quickly as possible. However, given that children are encouraged to walk orderly and slowly during a school fire drill<sup>5</sup>, the author believes this question may have confused students, although this confusion seems present only in the Maryland classroom results and the overall results are not necessarily indicative of this. The Maryland classes scored lowest on this question, with an average of 50 percent of students answering correctly, compared to the overall average of 75 percent. In the Maryland schools where the author did presentations, teachers encouraged students to answer positively and contradicted the presentation (i.e., that Pedro should in fact walk slowly to get out, whereas Pedro actually needs to move quickly). The author tried to emphasize that students do in fact need to move quickly and get out in less than 2 minutes, if smoke is visible, as well as moving carefully, but this evidently was not clear to all students after the presentation. The remark from one presenter for Class 2 (see Chapter 4.2.3) indicates that other presenters also felt that students may be confused, so perhaps the information needs to be clarified within the presentation.

While a majority of students were marked as answering this question correctly, Question 3 is the question with the lowest average score, and four classes had lower than a 60 percent correct answer rate even after being taught this information. It also seems unlikely the three Maryland classes would improve from 32-68 percent correctly to 76-100 percent correct one week after the presentation, given the confusion around Question 3. Perhaps, Maryland teachers misinterpreted this question when asking their students in the 1-week post-test. The author believes the American Red Cross could explore clarifying this question to students.

In addition to moving quickly if they see smoke, Prepare with Pedro also aims to teach students to “get low and go” in the case of smoke. While there is no question to test students’ knowledge, usually students practice this during the activity (although, as noted, this was more difficult to accomplish in virtual environments and with the Covid-19 pandemic). As

---

<sup>5</sup> This difference in required exit speed may be due to the different layouts, different materials, and larger size of schools, when compared to homes. School fires are far less deadly than home fires. Between 2014 and 2018, there were 3,230 fires in schools throughout the U.S., leading to one civilian death (Campbell, 2020: 1). In this same time period, there were 1,796,000 home fires in the U.S., leading to 13,390 civilian deaths (Ahrens and Maheshwari, 2021:4). Compared to home fire drills, school fire drills are required and occur regularly (Hull, 2011: 448).

previously mentioned, smoke inhalation can be fatal, and it is important that students learn to avoid it. As is discussed in Chapter 5.1.5, perhaps Question 3 could be changed slightly to avoid confusion, and to test if students have properly learned “get low and go”.

### **5.1.3 Smoke Alarms**

While practicing fire drills, getting out quickly, and “getting low and go” are all essential to fire safety, smoke alarms are another key component Prepare with Pedro focuses on. The National Fire Alarm Code requires hard-wired, interconnected smoke alarms with battery back-ups on every level of a home (American Red Cross, n.d.b), and about 96 percent of U.S. homes have them (National Institute of Standards and Technology, 2021). However, 20 percent of these are non-functioning (either due to missing or dead batteries, or the intentional disabling of the alarm) (National Institute of Standards and Technology, 2021). Smoke alarms are covered in Questions 1 and 4 of the pre-test and post-test. Question 1, which focused on the testing of smoke alarms, was a question most of the students did well on after the presentation (with 95 percent of students answering correctly), and some did even better on it in the 1-week post-test. This is perhaps because testing smoke alarms is one of the main topics covered in the story, and emphasis is placed on its importance. Given their visibility in the story, smoke alarms might be a topic that students brought up at home and discussed with their household. As previously discussed, a properly functioning smoke alarm significantly decreases one’s chance of dying in a home fire. Testing the alarm takes a few seconds, although this is one of the actions that requires adults to take the initiative.

Knowing the sound a smoke alarm makes, and what to do when it makes it, is as important as having one. Question 4 focuses on this sound and was the one question where the results were not statistically significant. Based on the results (see Figures 17 and 18), the students seemed to have knowledge of this beforehand. Perhaps they have heard smoke alarms before during school fire drills, or at home before, too. While all smoke alarms have a slightly different sound, it is recognizable enough whether at school or at home to not cause confusion. While students are likely already familiar with this topic, it still needs to be covered in the program, as some students were not familiar with it. As previously discussed, smoke alarms are among the most vital preparedness tools in a home fire and can ensure people are alerted to a fire. Their importance needs to continue to be highlighted.

The American Red Cross and other organizations have programs to help install free smoke alarms for those who need them. Information could be sent home with the Prepare with Pedro materials, so families are aware of the Home Fire Campaign and can easily access information about how to receive assistance (American Red Cross, n.d.a).

### **5.1.4 Preparedness**

While knowledge is important, the author also felt it was important to understand if students felt the program improved their feeling of preparedness. This was the aim with Question 5. Before the presentation, not many students felt prepared if a home fire were to occur. But this increased greatly post-presentation, as mentioned in Chapter 4.2.5. While many answered this question positively, there were less classes that had all of their students answer positively, perhaps due to this question being reliant on feeling rather than knowledge.

The results would indicate the presentation left students feeling more prepared if a fire were to occur at home.

As previously discussed, the question asked in the 1-week post-test was not the same as before/after the presentation, but rather was a combination of the results from two questions: if students had shared what they learned with anyone, and if they had designated a family meeting spot. Ideally the same question could have been asked, but given that this was not possible, the author felt these were also indicators of preparedness. These two questions were averaged, but as the full results (visible in Appendix B) show, a large majority of students in Class 1 did both actions, and over half of the students in Class 3 did them, too. However, Class 4 had a very low percentage of students who made a family meeting spot (only three students), and only seven students had shared anything with their families. The results would imply that while students in Class 1 and Class 3 felt motivated by Prepare with Pedro to take action, most of the students in Class 4 did not. This could also be indicative of a lack of adult involvement in the material too, which is discussed in Chapter 5.2.

Some would perhaps believe that 5–8-year-olds would not benefit from learning about fire safety and preparedness and that learning such material would only scare them. But previous research has found that not only are children as young as 2.5-3 years old (younger than those involved in Prepare with Pedro) able to understand and follow instructions in the case of a fire drill, but they are also not overly likely to be upset by unusual events (Taciuc and Dederichs, 2013). Research has also found children participating in a disaster preparedness program, in fact, had a lower sense of distress after involvement in the program (Ronan and Johnston, 2003: 1018). Moreover, learning about and discussing disasters from a young age may help children be more resilient and may make it easier for them to think about disaster issues (Torani et al., 2019: 4). Feelings of preparedness can also help motivate students to initiate conversations with their households about improving their preparedness at home.

#### **5.1.5 Potential Barriers to Knowledge Retention and Possible Bias**

While having the questions asked orally and answers reported through hand/thumb raising is not necessarily ideal, given the students' age it is necessary. However, this can lead to a bandwagon effect, as they are swayed by each other's answers. Despite being told to close their eyes to answer questions, most students, at least in the author's presentations, did not. This could lead to children answering correctly, despite not knowing the correct answer, both before and after the presentation. However, in having the questions answered in this way, the results are reported quickly, and it is possible to avoid the potential problem of low literacy and bad handwriting, which is common in this age group, has been faced in previous studies, and can lead to unintelligible results (Ronan et al., 2001: 7-8). When the children were asked questions during the author's presentation, they were sometimes distracted and rambled, or did not fully understand the question. However, this is not necessarily indicative of a lack of knowledge retention, but just the nature of children this young. This can also be dependent on the setting, as the author was not physically in the same room as the children and staring at a screen for so long without movement can cause children to be less attentive.

The author also believes the confusion associated with Question 3 could be problematic. Given the focus on "get low and go" during the presentation and how important this is in a situation where there is smoke during a fire, a question could be added to gauge

students' knowledge of this topic. Perhaps a question about "get low and go" could be combined with Question 3 to improve knowledge, particularly as they both focus on the same topic.

There is also the potential for the students' answer choices to have been impacted by acquiescence bias, which is the tendency to answer "yes" to a question (Holbrook, 2008: 4). Question 3 was the only question in which "no" was the correct answer. It also had the lowest number of correct answers both before and after the presentation. However, four of the questions received statistical significance when comparing the pre-presentation scores to the post-presentation scores, which would indicate that the increases that occurred are not due to chance. Within the scope of this thesis, it is not possible to look deeper into students' answer choices, and therefore this indicates that further research is necessary.

While teachers must remain in the classroom for safety reasons during the presentation, it is important that they remain uninvolved in teaching the material. As previously discussed, the Maryland teachers may have skewed the results for Question 3 by incorrectly encouraging students to move orderly rather than quickly during a fire. Given that these presentations were on Zoom, the teachers were more involved than they would be during an in-person presentation, and this represents one drawback of this presentation style.

While it is understandable that not everything can be covered in a short presentation like Prepare with Pedro, certain topics such as "stop-drop-and-roll", calling 911, and feeling if doors are warm before exiting through them could be covered during the presentation. While there might be worries that these topics could scare children or that they are not mature enough to talk to first responders, as has been already discussed, children have more resilience and agency than they are usually attributed.

### **5.1.6 Impact of Setting: In Person Versus Virtual**

As discussed in Chapter 4.1, there was a clear difference in the scores overall and for each question for the in-person classes (but were comprised of 100+ students) and those that were virtual (but only comprised an average of 21 students). In general, the in-person classes had higher scores both before and after the presentation, but also had smaller increases both in general and for each question. The virtual classes had lower scores before the presentation, and generally remained lower than the in-person classes after the presentation but had far greater increases. It is impossible to know why this is the case. These two different styles of presentation were necessary because of the Covid-19 pandemic. Due to this, it is difficult to discern whether the difference in average correct answers is related to the assembly versus class setting, the in-person versus virtual context, or an entirely unrelated reason. While several possibilities could account for this difference, given the impossibility of knowing the true answer, and that this does not fall directly under any of the research questions, this will not be discussed further. However, given the clear difference in scores, it was important to point it out at a high level, especially as virtual presentations may continue in the future. The American Red Cross may want to investigate this issue further.

### ***5.2 Adults' Knowledge of Home Fire Safety Material***

The third question this thesis asked was, "What knowledge do the students' adults report having?" Given the lack of responses to the Family Survey, it is difficult to conclude

anything substantial or generalizable from the survey. However, this does not mean the results cannot be discussed. It is possible the adults who responded to the survey (15 out of the 65 families, or 23 percent) represent a group that is particularly passionate about topics such as fire safety and perhaps are more likely than other adults to have interacted with the Prepare with Pedro material. But a lack of response does not mean an adult and their student did not interact with the material. It is possible far more adults than answered the survey discussed and interacted with the material with their student.

### **5.2.1 Interpreting the Survey**

The responses indicate that most of the families found the activity a helpful entry point into discussing fire safety. This was particularly true of the two adults who left comments of gratitude for the program being an entry point into a fire safety discussion (see Chapter 4.3.6). Most of the adults answered the survey questions correctly or positively, which would indicate they either already knew the answers, could figure out the correct answer, or that they read through the Prepare with Pedro: Home Fire book with their student. A majority of adults indicated they had interacted with the material with their student in some way (see Figure 22) and made some change within their household after the activity (see Figure 23). While most adults answered the question about how often to test one's smoke alarm correctly (monthly), a 2020 survey found only 25 percent of respondents actually tested their smoke detectors monthly (Covington, 2021). Perhaps the respondents to the family survey know that smoke alarms should be tested monthly but do not actually do it, or perhaps having young children in their household puts them in a group that does test monthly. Given that this was not a question that was asked in the survey, it is difficult to know.

As discussed in Chapter 4.3.6, those that answered questions incorrectly either had never learned about fire safety before or gave no response. Those that did not interact with the material also did not make changes in their household. Given the small size, it is difficult to discern if this is simply due to chance or if there is a correlation. It is unclear whether other adults' responses would echo the trends visible for those that answered the survey, or if those that answered the survey represent a group that is particularly likely to interact with the material with their student and answer questions correctly/positively.

In addition to the previously discussed limitations, it is also possible those who responded to the survey did not answer entirely truthfully, were impacted by social-desirability bias, and therefore answered how they *thought* they should. It is impossible to know if this is the case, and therefore, all responses are considered to be true.

### **5.2.2 Lack of Response and Teaching Preparedness to Adults**

Low response is common with surveys, and if low response occurs, it is difficult to know whether the sample is representative (Blaikie, 2010: 180). This holds true with the family survey. It is difficult to know both why more adults did not respond, and if those that did respond represent the group of adults as a whole or if they are distinct in some way. For example, the lack of response could mean that, as caretakers of small children, their time is quite limited, and answering surveys is not a priority for them, or that they did not look at the activity with their student, and therefore felt that answering the survey would not be prudent.

This lack of response might be related to the previously mentioned difficulties of providing disaster preparedness education to adults (Johnson et al., 2014b: 108). Adults with young children as a group are also generally less prepared, which was “related to reduced motivated and perceived ability to prepare”, as well as having less time (McNeill and Ronan, 2017:1251). Another study found households with young children were less likely to fulfill resource-based preparedness, but more likely to fulfill action-based preparedness (e.g., meeting spots and alternative communication plans) (Zamboni and Martin, 2020: 9). Previous research of similar types of programs have found that as with this program, children’s knowledge was significantly improved after the study (when compared to a control group), but that there was not a significant difference present in family planning or practice (Ronan et al., 2010: 519), which may be the result of lack of adult participation or willingness.

Prepare with Pedro is similar to other programs for this age group, like a Sesame Street TV program focused on disaster preparedness<sup>6</sup>, in that while there is a focus on activities children can do themselves, there is also a depiction of children as reliant on adults (Wachtendorf et al., 2008: 460-461). However, the focus on children of this age being reliant on adults might be beneficial – it encourages them to involve their adults in the material. While an older child might feel they can make an emergency kit themselves or plan out an escape route without the aid of their household, younger children are reliant on the support of their adults in these cases. Adult participation in children’s disaster preparedness education is essential: both because of children’s reliance on adults to make plans, decide meeting places, and set up tools such as smoke alarms, as well as the emotional impact that a child’s adults have on them. Research has found the reaction of an adult to a disaster is one of the most prominent factors in predicting their children’s reactions (Norris et al., 2002: 237). Strengthening children’s physical preparedness and emotional readiness can lead to improvements for their adults, and vice versa (Ronan et al., 2008: 346). As mentioned previously, preparedness programs like Prepare with Pedro that send home preparedness material with children considerably increase the likelihood that families will do preparedness actions (FEMA, 2014: 33; Ronan et al., 2015: 58), and thereby increasing the entire household’s likelihood of survival if a home fire were to occur.

---

<sup>6</sup> *Sesame Street: Friends to the Rescue* was a post-9/11 program that showed characters rebuilding after a storm and taught children both what to do and introduced discussion topics for families.

## **6. Conclusion**

### ***6.1 Key Findings and Prepare with Pedro's Impact***

This thesis set out to examine the impact of the Prepare with Pedro: Home Fire program on students and their households' knowledge of home fires. Based on the results, this thesis found that the students involved had greater knowledge of home fires after the presentation than before. All questions, other than the question focused on the sound the smoke alarm makes, were found to have statistically significant increases in correct answers. While there was an increase in the question discussing if students should quickly or slowly exit the building if there is smoke, based on classroom experiences, the author feels that this question could be reevaluated. In most cases in Maryland, this increase in knowledge was still present one week after the presentations. Individually, all classes saw an increase in correct answers for every question. While there was a low response rate to the Family Survey, most of the adults who participated were found to have interacted with the material with their students, and many answered the survey question correctly/positively. Therefore, it is concluded that the American Red Cross's Prepare with Pedro program had a generally positive impact on the students who participated and their households' knowledge of and attitude toward fire safety.

### ***6.2 Next Steps***

As mentioned, while this thesis looked at the increase in knowledge directly after the Prepare with Pedro presentation, further longitudinal studies are needed to examine if knowledge is retained by students, if changes at home are made, and if this knowledge proves valuable if a home fire occurs. The students that the author interacted with while presenting were generally interested in the home fire safety material, and some were already quite knowledgeable. For years, children, particularly ones as young as those focused on in this thesis, have been treated as dependents, but CCDRR allows children to become valuable contributors and have agency. Research has indicated that the participatory aspect of youth preparedness programs is incredibly important and allows children to learn through action (Ronan et al., 2016: 53) and repetition (Pooley et al., 2020: 36). Additional research incorporating several repetitions of the material could also be interesting and helpful. This could be connected to the American Red Cross's other youth preparedness program, the Pillowcase Project, and a longitudinal study comparing the fire safety knowledge of students who participated in either, both, and neither program would be particularly interesting.

The lack of response to the Family Survey indicates that more work needs to be done to involve households, and to get feedback from them. A research study involving adults in the pre-tests and post-tests could better gauge if a program like Prepare with Pedro also improves knowledge for the students' adults. By involving adults in multiple geographical locations, more data could be gathered. Interviews with adults could also perhaps add greater perspective to the subject.

Given that Prepare with Pedro is not simply a fire safety program, but covers other hazards, it could be interesting to explore whether these experience similar increases in knowledge. This could indicate whether it is simply fire safety as a topic that allows for such increases in knowledge, or if it is the program design that is particularly effective at teaching children disaster preparedness. Another potential area for further research is to examine if



there are differing impacts of in person and online teaching. Perhaps to improve the CCDRR aspects of the Prepare with Pedro program and others like it, students could be involved in the program's improvement, and consulted on what they liked, and what they believe should be improved. This recommendation and the others already mentioned which specifically relate to Prepare with Pedro will be summarized and shared with the American Red Cross.

Additionally, while difficult due to the unpredictability of disasters, there is a need for further research that examines if youth preparedness education programs have an impact in the response and recovery phases of a hazard event (Ronan et al., 2015: 58). While the American Red Cross has a Prepare with Pedro activity book specifically for those who have experienced a traumatic emergency event that focuses on resilience and coping (American Red Cross, 2021), it would be difficult to examine the impact of this.

Programs like Prepare with Pedro allow for children to interact with fire safety material and learn about it in an age-appropriate way. Home fires are a disaster that can occur to anyone, anywhere, and at any time. It is important for everyone to be aware of how to be prepared for a fire, and what to do if one occurs, as these are lifesaving skills. This thesis and research like it provide vital feedback to further improve youth preparedness education programs, so that these programs can better empower children and provide a solid foundation as they become lifelong disaster-prepared citizens.

## References

Ahrens, M. (2021). Smoke Alarms in US Home Fires. Available at <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Detection-and-signaling/ossmokealarms.ashx>. Accessed on 10 March 2022.

Ahrens, M. & Everts, B. (2021). Fire Loss in the United States During 2020. Available at [https://www.nfpa.org/~/-/media/fd0144a044c84fc5baf90c05c04890b7.ashx#:~:text=In%202020%2C%20an%20estimated%20379%2C500.property%20damage%20\(40%20percent\)](https://www.nfpa.org/~/-/media/fd0144a044c84fc5baf90c05c04890b7.ashx#:~:text=In%202020%2C%20an%20estimated%20379%2C500.property%20damage%20(40%20percent)). Accessed on 10 March 2022.

Ahrens, M. & Maheshwari, R. (2021). Home Structure Fires: Supporting Tables. Available at <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Building-and-life-safety/oshomefirestable.pdf>. Accessed on 15 April 2022.

American Red Cross (2021). Prepare with Pedro! Resilience & Coping Skills Activity Book. Available at [https://www.redcross.org/content/dam/redcross/get-help/youth/pwp/resilience/en-redcross-preparewithpedro-resilience-and-coping-story\\_1.28.22.pdf](https://www.redcross.org/content/dam/redcross/get-help/youth/pwp/resilience/en-redcross-preparewithpedro-resilience-and-coping-story_1.28.22.pdf). Accessed on 25 April 2022.

American Red Cross (2022a, March 13). 100,000. That's how many students our Prepare with Pedro program has reached since its inception in 2017. To celebrate this [Image attached] [Post]. LinkedIn. Available at [https://www.linkedin.com/posts/american-red-cross\\_100000-thats-how-many-students-activity-6908069214834552832-uHxJ?utm\\_source=linkedin\\_share&utm\\_medium=member\\_desktop\\_web](https://www.linkedin.com/posts/american-red-cross_100000-thats-how-many-students-activity-6908069214834552832-uHxJ?utm_source=linkedin_share&utm_medium=member_desktop_web). Accessed on 15 March 2022.

American Red Cross (2022b). Prepare with Pedro. Available at <https://www.redcross.org/get-help/how-to-prepare-for-emergencies/teaching-kids-about-emergency-preparedness/prepare-with-pedro.html>. Accessed on 20 February 2022.

American Red Cross. (2017a). Home Fires: Frequently Asked Questions. Available at [https://www.redcross.org/content/dam/redcross/atg/PDF\\_s/Preparedness\\_Disaster\\_Recovery/Disaster\\_Preparedness/Home\\_Fire/FireFAQs.pdf](https://www.redcross.org/content/dam/redcross/atg/PDF_s/Preparedness_Disaster_Recovery/Disaster_Preparedness/Home_Fire/FireFAQs.pdf). Accessed on 16 March 2022.

American Red Cross. (2017b). *Prepare with Pedro!* Available at <https://www.redcross.org/content/dam/redcross/get-help/youth/pwp/en/RedCross-PrepareWithPedro-HomeFire-Story.pdf>. Accessed on 10 February 2022.

American Red Cross. (2020). Prepare with Pedro: Educational Standards Report.

American Red Cross. (n.d.) Schedule a Free Red Cross Home Fire Safety Visit. Available at <https://www.redcross.org/local/new-york/eastern-new-york/about-us/our-work/home-fire-campaign/home-fire-safety-visit.html>. Accessed on 19 April 2022.

American Red Cross. (n.d.). Smoke Alarms. Available at <https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/fire/fire-safety-equipment.html>. Accessed on 19 April 2022.

AmeriCorps. (2022). Join AmeriCorps. Available at <https://americorps.gov/join>. Accessed on 10 March 2022.

Asian Disaster Preparedness Center, European Commission's Humanitarian Aid Department, DIPECHO Partners in Bangladesh, & Handicap International. (2010). Child Centered Disaster Risk Reduction. Available at

[https://www.preventionweb.net/files/16786\\_ccdrrguidebook1.pdf](https://www.preventionweb.net/files/16786_ccdrrguidebook1.pdf). Accessed on 20 April 2022.

Blaikie, N. (2010). *Designing Social Research: The Logic of Anticipation* (2nd ed.). Cambridge and Malden: Polity Press.

California Code of Regulations. (2011). Tit. 19, § 3.13. Available at <https://www.law.cornell.edu/regulations/california/Cal-Code-Regs-Tit-19-SS-3-13>. Accessed on 20 April 2022.

Cambridge University Press. (n.d.a) Attitude. In *Cambridge dictionary*. Retrieved 13 August 2022 from <https://dictionary.cambridge.org/us/dictionary/english/attitude>.

Cambridge University Press. (n.d.b) Knowledge. In *Cambridge dictionary*. Retrieved 13 August 2022 from <https://dictionary.cambridge.org/us/dictionary/english/knowledge>.

Cambridge University Press (n.d.c) Learning. In *Cambridge dictionary*. Retrieved 13 August 2022 from <https://dictionary.cambridge.org/us/dictionary/english/learning>.

Campbell, R. (2020). Structure Fires in Schools. Available at <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Building-and-life-safety/osSchools.pdf>. Accessed on 20 April 2022.

Coppola, D.P. (2011). *Introduction to international disaster management*. Oxford: Butterworth-Heinemann: Elsevier.

Covington, T. (2021, 6 June). Code Red: Survey Finds 3 in 4 Americans Ignore Smoke Detector Safety Procedures. *The Zebra*. Available at:

<https://www.thezebra.com/resources/home/smoke-detector-safety-survey/#:~:text=Since%20properly%20working%20smoke%20alarms,make%20sure%20it's%20functioning%20properly>. Accessed on 20 April 2022.

FEMA. (2010). Bringing Youth Preparedness Education to the Forefront: A Literature Review and Recommendations. *Citizen Preparedness Review*, 6. Available at [https://www.ready.gov/sites/default/files/2019-06/bringing\\_youth\\_preparedness\\_to\\_the\\_forefront.pdf](https://www.ready.gov/sites/default/files/2019-06/bringing_youth_preparedness_to_the_forefront.pdf). Accessed on 20 April 2022.

FEMA. (2014). Preparedness in America. Available at [https://www.ready.gov/sites/default/files/2021-03/Preparedness%20in%20America\\_August-2014.pdf](https://www.ready.gov/sites/default/files/2021-03/Preparedness%20in%20America_August-2014.pdf). Accessed on 20 March 2022.

Holbrook, A. (2008). Acquiescence response bias. In P. J. Lavrakas (Ed.), *Encyclopedia of survey research methods* (pp. 4). Sage Publications, Inc. Available at <https://dx.doi.org/10.4135/9781412963947.n3>. Accessed on 26 August 2022.

Hull, B. (2011). Changing realities in school safety and preparedness. *Journal of Business Continuity & Emergency Planning*, 5(1), 440-451.

JBER Fire & Emergency Services. (2019). Fire Drills. Available at <https://www.jber.jb.mil/Portals/144/Services-Resources/FirePrevention/PDF/Fire-Drills-Safety-Handout.pdf>. Accessed on 15 April 2022.

Johnson, V. A. (2011). *Disaster preparedness education in schools: Recommendations for New Zealand and the United States*. Wellington: Fulbright New Zealand.

Johnson, V. A., Johnston, D. M., Ronan, K. R., & Peace, R. (2014a). Evaluating children's learning of adaptive response capacities from ShakeOut, an earthquake and tsunami drill in two Washington State school districts. *Journal of Homeland Security and Emergency Management*, 11(3), 347-373.

Johnson, V. A., Ronan, K. R., Johnston, D. M., & Peace, R. (2014b). Evaluations of disaster education programs for children: A methodological review. *International journal of disaster risk reduction*, 9, 107-123.

Jones, R. T., & Ollendick, T. H. (2002). Residential fires. In A. M. La Greca, W. K. Silverman, E. M. Vernberg, & M. C. Roberts (Eds.), *Helping children cope with disasters and terrorism* (pp. 175–199). American Psychological Association. <https://doi.org/10.1037/10454-008>

Kourofsky, C. E., & Cole, R. E. (2010). Young Children Can Be Key in Fire-Safe Families. *YC Young Children*, 65(3), 84.

Liberty Mutual Insurance. (2012, 4 October). New Study Shows Alarming Lack Of Practice In Family Fire Safety Plans. *PRNewswire Cision*. Available at: <https://www.prnewswire.com/news-releases/new-study-shows-alarming-lack-of-practice-in-family-fire-safety-plans-172497301.html>. Accessed on 18 April 2022.

London Fire Brigade. (2020). Noisy's Big Book for KS1. Available at <https://www.london-fire.gov.uk/media/4871/noisy-big-book-ks1-lfb-london-fire-brigade.pdf>. Accessed on 15 April 2022.

McNeill, I. M., & Ronan, K. R. (2017). Children in disasters: the role of household preparedness. *Natural hazards*, 89(3), 1239-1254.

Mitchell, T., Haynes, K., Hall, N., Choong, W., & Oven, K. (2008). The roles of children and youth in communicating disaster risk. *Children Youth and Environments*, 18(1), 254-279.

National Center for Education Statistics. (2021). Table 203.60: Enrollment and percentage distribution of enrollment in public elementary and secondary schools, by race/ethnicity and level of education: Fall 1999 through fall 2030. Available at [https://nces.ed.gov/programs/digest/d21/tables/dt21\\_203.60.asp](https://nces.ed.gov/programs/digest/d21/tables/dt21_203.60.asp). Accessed on 20 April 2022.

National Fire Protection Association. (n.d.). Reporter's Guide: The consequences of fire. Available at <https://www.nfpa.org/News-and-Research/Publications-and-media/Press-Room/Reporters-Guide-to-Fire-and-NFPA/Consequences-of-fire>. Accessed on 15 April 2022.

National Institute of Standards and Technology. (2021). Smoke Alarm Research. Available at <https://www.nist.gov/el/smoke-alarm-research#:~:text=Smoke%20alarms%20are%20now%20installed,1100%20lives%20saved%20per%20year>. Accessed on 15 April 2022.

Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry: Interpersonal and biological processes*, 65(3), 207-239.

Peek, L. (2008). Children and Disasters: Understanding Vulnerability, Developing Capacities, and Promoting Resilience: An Introduction. In *Children, Youth and Environments* (Vol. 18, Issue 1). <http://www.colorado.edu/journals/cye>.

Peek, L., Abramson, D. M., Cox, R. S., Fothergill, A., & Tobin, J. (2018). Children and disasters. In *Handbook of disaster research* (pp. 243-262). Springer, Cham.

Pendziwol, J. (1999). *No Dragons for Tea: Fire Safety for Kids (and Dragons)*. Kids Can Press Ltd.

Pooley, K., Nunez, S., & Whybro, M. (2021). Evidence-based practices of effective fire safety education programming for children. *The Australian Journal of Emergency Management*, 36(2), 34-41.

Reinking, D., & Alvermann, D.E. (2005). What are evaluation studies, and should they be published in RRQ? *Reading Research Quarterly*, 40(2), 142-146.

Ronan, K. R., Alisic, E., Towers, B., Johnson, V. A., & Johnston, D. M. (2015). Disaster preparedness for children and families: a critical review. *Current psychiatry reports*, 17(7), 1-9.

Ronan, K. R., Crellin, K., & Johnston, D. (2010). Correlates of hazards education for youth: a replication study. *Natural hazards*, 53(3), 503-526.

Ronan, K. R., Crellin, K., Johnston, D. M., Finnis, K., Paton, D., & Becker, J. (2008). Promoting child and family resilience to disasters: Effects, interventions, and prevention effectiveness. *Children Youth and Environments*, 18(1), 332-353.

Ronan, K.R. & Johnston, D.M. (2003). Hazards Education for Youth: A Quasi-Experimental Investigation. *Risk Analysis*, 23(5), 1009-1020.

Ronan, K.R., Haynes, K., Amri, A., Towers, B., Alisic, E., Davie, S., Ireland, N., & Petal, M. (2016). Child-centred disaster risk reduction: can disaster resilience programs reduce risk and increase the resilience of children and households? *Australasian Journal of Emergency Management*, 31(3), 49-58.

Ronan, K.R., Johnston, D.M., Daly, M., & Fairley, R. (2001). School Children's Risk Perceptions and Preparedness: A Hazards Education Survey. *The Australasian Journal of Disaster and Trauma Studies*, 1.

San Francisco Fire Department (n.d.). Home Fire Facts. Available at <https://sf-fire.org/home-fire-facts>. Accessed on 15 April 2022.

Taciuc, A. & Dederichs, A.S. (2013). Determining Self-Preservation Capability in Pre-School Children. The Fire Protection Research Foundation. Available at <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Building-and-life-safety/DayCareCentersResearch.ashx>. Accessed on 13 April 2022.

Torani, S., Majd, P. M., Maroufi, S. S., Dowlati, M., & Sheikhi, R. A. (2019). The importance of education on disasters and emergencies: A review article. *Journal of education and health promotion*, 8.

U.S. Department of Homeland Security. (2021a). Home Fires. Available at <https://www.ready.gov/home-fires>. Accessed on 15 April 2022.

U.S. Department of Homeland Security. (2021b). Practice Your Home Fire Escape Plan. Available at <https://www.ready.gov/home-fire-escape-plan>. Accessed on 15 April 2022.

U.S. Fire Administration. (2019). Fire Deaths, Fire Death Rates and Risk of Dying in a Fire. Available at: [https://www.usfa.fema.gov/data/statistics/fire\\_death\\_rates.html#tab-2a](https://www.usfa.fema.gov/data/statistics/fire_death_rates.html#tab-2a). Accessed on 10 April 2022.

UN General Assembly, *Convention on the Rights of the Child* (1989, 20 November) United Nations, Treaty Series, vol. 1577, p. 3. Available at <https://www.refworld.org/docid/3ae6b38f0.html>. Accessed on 5 April 2022.

UN Youth. (2013). Definition of Youth. Available at <https://www.un.org/esa/socdev/documents/youth/fact-sheets/youth-definition.pdf>. Accessed on 15 March 2022.

UNISDR. (2005). Hyogo Framework for Action 2005-2015. Geneva: United Nations Office for Disaster Risk Reduction. Available from [http://www.unisdr.org/files/1037\\_hyogoframeworkforactionenglish.pdf](http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf)

Wachtendorf, T., Brown, B., & Nickle, M. C. (2008). Big bird, disaster masters, and high school students taking charge: The social capacities of children in disaster education. *Children Youth and Environments*, 18(1), 456-469.

White, G. (2017). Final Report: Community Impact Study of International Youth Preparedness Program (“The Pillowcase Project”). Available at [https://preparecenter.org/wp-content/sites/default/files/pillowcase\\_impact\\_study\\_-\\_final\\_report.pdf](https://preparecenter.org/wp-content/sites/default/files/pillowcase_impact_study_-_final_report.pdf). Accessed on 10 February 2022.

Yin, D. R. K. (2012). *Applications of Case Study Research*. United States: SAGE Publications.

Zamboni, L. M., & Martin, E. G. (2020). Association of US households’ disaster preparedness with socioeconomic characteristics, composition, and region. *JAMA network open*, 3(4), e206881-e206881.

## Appendix A: Prepare with Pedro Learning Objectives

The Prepare with Pedro presentation is a 30–45 minute classroom-based presentation that teaches students to:

- Identify the best ways to stay safe during emergencies that can occur in their communities
- Identify the best ways to prevent and stay safe during a home fire
- Use coping skills to help manage stress during emergencies and in everyday situations
- Gain confidence in their abilities to be prepared for emergencies through hands-on activities
- Use their knowledge to act as advocates for emergency preparedness in their homes and communities
- Discuss the role science plays in emergency preparedness

(From the Prepare with Pedro: Education Standards Report; American Red Cross, 2020)

## Appendix B: Pre-Test, Post-Test, and 1-week Post-Test Results

Class #	Code	Total Students	Q1	Q2	Q3	Q4	Q5
Class 1	MD_1	21	10	10	6	19	13
Class 2	NY_1	234	190	234	150	234	150
Class 3	MD_2	22	3	7	6	12	6
Class 4	MD_3	22	11	15	4	10	5
Class 5	CA_1	131	103	112	74	109	85
Class 6	CA_2	97	88	86	33	75	68
Class 7	NH_1	23	23	20	9	23	3
Class 8	NH_2	24	22	10	5	24	6
Class 9	NH_3	18	15	18	5	18	3
Class 10	NH_4	19	15	8	3	17	4
Class 11	NH_5	20	14	9	5	20	4
Class 12	NH_6	21	10	11	2	21	2
<b>Totals</b>		<b>652</b>	<b>504</b>	<b>540</b>	<b>302</b>	<b>582</b>	<b>349</b>

Table B1. A table showing the results of the pre-test, using the number of students reported as answering correctly/positively.

Class #	Code	Q1	Q2	Q3	Q4	Q5	Overall Average
Class 1	MD_1	0.47	0.47	0.28	0.9	0.62	0.548
Class 2	NY_1	0.85	1	0.65	1	0.65	0.83
Class 3	MD_2	0.13	0.31	0.27	0.55	0.27	0.306
Class 4	MD_3	0.5	0.68	0.18	0.45	0.23	0.408
Class 5	CA_1	0.79	0.85	0.56	0.83	0.65	0.74
Class 6	CA_2	0.91	0.89	0.34	0.77	0.70	0.72
Class 7	NH_1	1.00	0.87	0.39	1.00	0.13	0.68
Class 8	NH_2	0.92	0.42	0.21	1.00	0.25	0.56
Class 9	NH_3	0.83	1.00	0.28	1.00	0.17	0.66
Class 10	NH_4	0.79	0.42	0.16	0.89	0.21	0.49
Class 11	NH_5	0.70	0.45	0.25	1.00	0.20	0.52
Class 12	NH_6	0.48	0.52	0.10	1.00	0.10	0.44
<b>Averages</b>		<b>0.697</b>	<b>0.657</b>	<b>0.305</b>	<b>0.867</b>	<b>0.348</b>	<b>0.575</b>

Table B2. A table showing the results of the pre-test, using the percentage of students who answered correctly/positively calculated for each class, and overall.

Class #	Code	Total Students	Q1	Q2	Q3	Q4	Q5
Class 1	MD_1	21	18	21	11	21	21
Class 2	NY_1	234	234	234	234	234	180



Class 3	MD_2	22	22	22	15	15	20
Class 4	MD_3	22	15	16	7	22	22
Class 5	CA_1	131	129	130	126	129	124
Class 6	CA_2	97	90	96	54	90	89
Class 7	NH_1	23	23	23	21	23	19
Class 8	NH_2	24	24	24	20	24	20
Class 9	NH_3	18	18	18	15	18	13
Class 10	NH_4	19	19	19	15	19	14
Class 11	NH_5	20	20	20	15	20	16
Class 12	NH_6	21	21	21	20	21	19
<b>Totals</b>		<b>652</b>	<b>633</b>	<b>644</b>	<b>553</b>	<b>636</b>	<b>557</b>

Table B3. A table showing the results of the post-test, using the number of students reported to answer correctly/positively.

Class #	Code	Q1	Q2	Q3	Q4	Q5	Overall Averages
Class 1	MD_1	0.86	1	0.52	1	1	0.88
Class 2	NY_1	1.00	1	1.00	1	0.77	0.95
Class 3	MD_2	1.00	1	0.68	0.68	0.91	0.85
Class 4	MD_3	0.68	0.73	0.32	1	1	0.75
Class 5	CA_1	0.98	0.99	0.96	0.98	0.95	0.97
Class 6	CA_2	0.93	0.99	0.56	0.93	0.92	0.86
Class 7	NH_1	1.00	1.00	0.91	1.00	0.83	0.95
Class 8	NH_2	1.00	1.00	0.83	1.00	0.83	0.93
Class 9	NH_3	1.00	1.00	0.83	1.00	0.72	0.91
Class 10	NH_4	1.00	1.00	0.79	1.00	0.74	0.91
Class 11	NH_5	1.00	1.00	0.75	1.00	0.80	0.91
Class 12	NH_6	1.00	1.00	0.95	1.00	0.90	0.97
<b>Averages</b>		<b>0.95</b>	<b>0.98</b>	<b>0.76</b>	<b>0.97</b>	<b>0.86</b>	<b>0.90</b>

Table B4. A table showing the results of the post-test using the percentage of students reported to answer correctly/positively, calculated for each class and overall.

Class #	Code	Total Students	Q1	Q2	Q3	Q4	Q5	Q6
Class 1	MD_1	20	17	18	18	20	20	17
Class 3	MD_2	20	20	20	20	20	17	12
Class 4	MD_3	21	17	19	16	19	7	3
<b>Totals</b>		<b>61</b>	<b>54</b>	<b>57</b>	<b>54</b>	<b>59</b>	<b>44</b>	<b>32</b>

Table B5. A table showing the results of the 1-week post-test, using the number of students reported to answer correctly/positively.

Class #	Code	Q1	Q2	Q3	Q4	Q5	Q6	Overall Averages
Class 1	MD_1	0.85	0.9	0.9	1	1	0.85	0.915

Class 3	MD_2	1.00	1.00	1.00	1.00	0.85	0.60	0.95
Class 4	MD_3	0.81	0.90	0.76	0.90	0.33	0.14	0.72
<b>Averages</b>		<b>0.89</b>	<b>0.93</b>	<b>0.89</b>	<b>0.97</b>	<b>0.73</b>	<b>0.53</b>	<b>0.86</b>

*Table B6. A table showing the results of the 1-week post-test, using the percentage of students reported to answer correctly/positively, calculated for each class and overall.*

## Appendix C: SPSS One-Way ANOVA Results

The below tables show the results of the one-way ANOVA test that was completed in the platform SPSS. The pre-test and post-data for each of the 12 classes was used to reach these results. “1” refers to the pre-test and “2” refers to the post-test. The tables include the descriptive statistics presented, as well as the full table of results from the one-way ANOVA test.

### Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		
					Lower Bound	Upper Bound	Minimum
Q1_alarm	1	12.6972	.25290	.07301	.5365	.8579	.13
	2	12.9542	.09634	.02781	.8930	1.0154	.68
	Total	24.8257	.22859	.04666	.7292	.9222	.13
Q2_drill	1	12.6571	.25298	.07303	.4963	.8178	.31
	2	12.9758	.07751	.02238	.9266	1.0251	.73
	Total	24.8165	.24492	.04999	.7130	.9199	.31
Q3_smoke	1	12.3062	.16186	.04673	.2034	.4091	.10
	2	12.7583	.20551	.05932	.6278	.8889	.32
	Total	24.5323	.29334	.05988	.4084	.6562	.10
Q4_sound	1	12.8660	.18896	.05455	.7459	.9861	.45
	2	12.9662	.09237	.02666	.9075	1.0249	.68
	Total	24.9161	.15420	.03148	.8510	.9812	.45
Q5_prepared	1	12.3482	.23177	.06691	.2010	.4955	.10
	2	12.8683	.10143	.02928	.8039	.9328	.72
	Total	24.6083	.31808	.06493	.4740	.7426	.10
Score_avg	1	12.5751	.15402	.04446	.4773	.6730	.31
	2	12.9049	.06444	.01860	.8640	.9459	.75
	Total	24.7400	.20422	.04169	.6538	.8262	.31

Table C1. A table showing the result of the descriptive statistics done in SPSS using the pre-test and post-test data.

### ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q1_alarm	Between Groups	.396	1	.396	10.820	.003
	Within Groups	.806	22	.037		
	Total	1.202	23			
Q2_drill	Between Groups	.610	1	.610	17.416	<.001
	Within Groups	.770	22	.035		
	Total	1.380	23			
Q3_smoke	Between Groups	1.226	1	1.226	35.840	<.001
	Within Groups	.753	22	.034		
	Total	1.979	23			
Q4_sound	Between Groups	.060	1	.060	2.725	.113
	Within Groups	.487	22	.022		
	Total	.547	23			
Q5_prepared	Between Groups	1.623	1	1.623	50.715	<.001
	Within Groups	.704	22	.032		
	Total	2.327	23			

Score_avg	Between Groups	.653	1	.653	46.825	<.001
	Within Groups	.307		22.014		
	Total	.959		23		

*Table C2. A table showing the results of the one-way ANOVA test done in SPSS using the pre-test and post-test data for each of the questions as well as an average of the students' results.*

## Appendix D: Family Survey Results

The Family Survey was sent out by the teachers of Class 1, Class 3, and Class 4 to their students' adults via email. The survey was available on the site Wufoo, and different links were sent to each class to differentiate the classes, however, no other identifying information was collected. An "X" indicates that the adult did not select an answer for that question.

### Class 1:

#	Q1	Q2	Q3	Q4	Q5	Comments?
1	Yes	Yes (both)	X	Monthly	X	
2	Yes	Yes (checklist)	Drill	Monthly	Get low and go	
3	X	Yes (both)	Drill	Bimonthly	Get low and go	
4	No	No	X	Monthly	Get low and go	
5	Yes	Yes (activity)	X	Monthly	Get low and go	
6	X	Yes (activity)	Kit	Yearly	Stay high and fly	
7	X	Yes (checklist)	Alarm	Monthly	Get out in 2 minutes	My child learn how to prepare for emergencies. Thank you

Table D5. A table showing the results of the family survey for Class 1.

### Class 3:

#	Q1	Q2	Q3	Q4	Q5	Comments?
1	Yes	Yes (activity)	Alarm	Monthly	Get low and go	
2	Yes	Yes (activity)	Plan	Monthly	Get low and go	
3	Yes	Yes (activity)	Plan; Kit	Monthly	Get low and go	
4	No	Yes (activity)	X	Monthly	Get low and go	

Table D6. A table showing the results of the family survey for Class 3.

### Class 4:

#	Q1	Q2	Q3	Q4	Q5	Comments?
1	Yes	Yes (both)	Plan	Monthly	Get out in 2 minutes	
2	No	No	X	Yearly	Get low and go	
3	Yes	Yes (activity)	Alarm; Plan; Drill; Kit	Monthly	Get low and go	
4	Yes	Yes (both)	Alarm; Plan; Drill; Kit	Monthly	Get low and go	Thank you for creating this! We had a great family discussion with our 7, 5 and 3 year old.

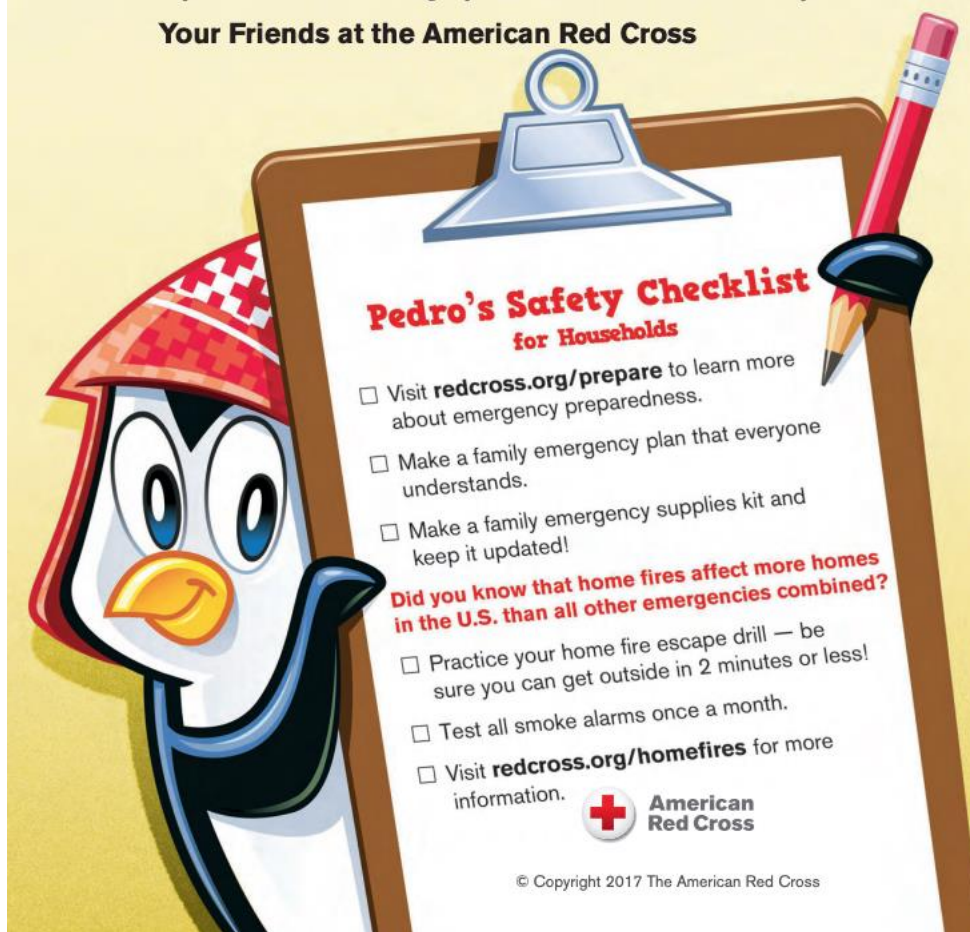
Table D7. A table showing the results of the family survey for Class 4.

## Appendix E: Pedro's Safety Checklist

### Grown-ups —

We hope that your child has enjoyed learning how to prepare for an emergency. To learn more, please visit the American Red Cross website at [redcross.org/prepare](https://www.redcross.org/prepare). You will find advice on staying safe in all types of emergency situations, and directions for how to create an emergency plan and an emergency supplies kit to keep in your home. Join us and get your household Red Cross Ready!

### Your Friends at the American Red Cross



(From *Prepare with Pedro: Home Fire*; American Red Cross, 2017: 8)