


2015

Children and Disaster Education: An Analysis of Disaster Risk Reduction within the School Curricula of Oregon, Texas, and the Philippines

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**Children and Disaster Education: An Analysis of Disaster Risk Reduction within the School
Curricula of Oregon, Texas, and the Philippines**

Ashley Merchant

Concordia University

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Abstract

For the past few decades, there has been a significant increase in the intensity and frequency of disasters. This has created a growing interest in the issue of disaster risk reduction among the global population. Past research has shown that proper planning and the use of protective measures can reduce the effects of a disastrous event. Preparedness is not only the responsibility of a nation's government or relief agencies, but also of every member of the community, including the vulnerable population of children. The United Nations has called for disaster risk reduction education to be implemented in schools around the world. Providing children with disaster education is the first step towards creating a culture of preparedness and fostering responsible citizens within the community. Through the examination of public school curricula in the Philippines, Oregon, and Texas, this research aims to explore the level of disaster risk reduction implementation and identify potential gaps. Results of this study show that disaster risk reduction education is present within the curriculum framework, but there are still many elements from the UNICEF/UNESCO best practices checklist that are not being fulfilled. Governments, education agencies, and teachers could use this research to determine how to fill these voids.

Keywords: disaster risk reduction, disaster preparedness, disaster education, children, curriculum, education, the Philippines, Oregon, Texas

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Chapter One: Introduction

Whether an event is called a crisis, an emergency, or a disaster, many people can be affected by it in a number of different ways. Some people lose their lives, while some lose friends or family members; in addition, homes or businesses can be destroyed, and in some cases, even the infrastructure of entire towns can be devastated. Disasters can have physical, emotional, and economical effects on the lives of communities and individuals, and vulnerable populations have the potential of being severely affected. Children are among those vulnerable populations. A study concerning Hurricane Katrina showed that 34% of children were separated from their primary caregiver while displaced, 21% saw friends or family members injured, 14% saw friends or family members killed, and 63% lost personal belongings (Osofsky & Osofsky, 2006). As a result, such events can cause children stress and affect their psychological health, which has the potential to affect them for years to come.

By informing children about how to prepare for and respond to disasters, they become involved in the process. Through involvement, children have a greater power over the outcome of their situation, which consequently makes them less vulnerable both during and after an event. By mentally and physically preparing children for an event, families and communities can diminish some of the concern they have in a disaster's aftermath. These children are also less likely to have post disaster psychological responses and are more likely to be resilient. Preparing them for a potentially traumatizing event is key.

Providing information to protect against these disasters and situations has become an important area of focus. Many players are involved in trying to improve the way that preparedness is viewed and implemented. Those organizations active in the United States include the Federal Emergency Management Agency (FEMA) and the American Red Cross. Groups such as these have fostered several initiatives for the future of disaster preparedness and response.

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However, the future of disaster preparedness and response is dependent on the next generation's knowledge and inclusion in the disaster process. According to Lekies and Wells (2006), people are fixed on a particular trajectory toward an outcome, and they will stay on this path unless a turning point occurs that sets them on a different trajectory (Lekies & Wells, 2006). Accordingly, children need to be set on a trajectory that empowers them to protect themselves. There are currently many resources out there to assist in teaching children what to do; however, that information does not always reach them. If children continue to lack understanding and the ability to respond to a disaster effectively, then how can they be expected to be able to do so when they are adults who are in charge of making important decisions for their families and/or communities? A major challenge facing society today is insufficient knowledge being dispersed to children regarding preparing for a disaster and knowing how to respond when a disaster does strike. How can they be set on a trajectory that enables them to take charge of their own safety in a time of disaster? To answer this question, the importance of being prepared, the role of children, and current preparedness resources need to be considered.

Significance

This research project analyzed the curricula and approaches taken by the Philippines and the United States in order to determine how current programs compare to recommended practice and explore what could be done to better inform and protect the children attending their schools. The outcome of this study allows parents, citizens, and government officials to learn about how effective their curriculum has been in including disaster preparedness and disaster risk reduction in students' education. Identified deficits may prompt parents to push for more effective disaster education or to take on the task of providing his or her children with disaster preparedness information themselves. If the Philippines', Oregon's, and/or Texas' disaster education curriculum is assessed as being successful, then parents, as well as the community, may feel more confident in the abilities and resilience of their

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children when a disaster occurs. The results of this study could be generalized to spread awareness to other countries and states about the effectiveness of existing practices and prompt them to take a closer look at their curriculum and any disaster education program that they may be currently using. If parents, citizens, and those in charge of education and curricula have access to the results of this study, then those results could help spread the importance of disaster preparedness and potentially save lives in turn.

Research Question

Research has shown the significance of preparing for a disaster before it happens. Communities and individuals can relieve the amount of money spent, properties damaged, and lives lost due to a natural disaster or emergency. Involving vulnerable populations, who can often be severely affected by these events, can have an impact on their resilience and psychological well-being. Children, being a key element of vulnerable populations, can benefit from the knowledge of preparing for and responding to disastrous events. Instilling them with this knowledge results in a reduction of the stress on their families, as well as their communities, by allowing them to focus on other priorities. Research also shows that there are currently several resources for teaching the community and youth how to be prepared before a disaster, and what to do when a disaster occurs. Several countries have integrated disaster education into their curriculum. UNICEF/UNESCO has published recommended content for disaster preparedness curriculum. In turn, the integration of disaster risk reduction into education systems poses the question: Do the three examples of disaster curriculum studied present the elements of best practices identified by the UNICEF/UNESCO checklist?

Chapter Two: Literature Review

Disasters and Preparedness

The following review examines sources that reflect a position on the value of certain disaster preparedness curriculum by defining the nature of disasters, their impact on populations, and the benefits of child involvement in the disaster preparedness process. Disasters come in a variety of shapes and sizes, and can affect a city, a region, a state, or even an entire nation. According to Shaluf (2007), there are three different types of disasters: man-made, natural and hybrid. Man-made disasters are events such as chemical spills, industrial accidents, marine pollution, war, and acts of terror. Hybrid disasters are those that result from both man-made and natural causes (Shaluf, 2007). Figure 1 on the following page provides a flow chart that shows the classifications of disasters. Natural disasters are the result of a natural hazard affecting a vulnerable area where human activities occur. If there is no human involvement with the event, such as a dust storm in the middle of an uninhabited desert, then it is not considered a natural disaster (Nature's Attack, n.d.). Natural disasters can be broken down into three categories: those caused by movements of the Earth, such as earthquakes, volcanic eruptions, and tsunamis; those related to weather, such as hurricanes, tornadoes, extreme heat, and extreme cold; and those that are typically the result of weather events or accompany other natural disasters, such as floods, mudslides, landslides, and famine (Evans, 2011). Sometimes, there are warnings of impending disasters that give people time to prepare and act before they strike; however, there are also many other types of disasters that give no warning in advance (Randall, 2006). Certain types of disasters, such as hurricanes or tornadoes, happen during specific times of the year, while others, such as earthquakes, can happen at any time of year (Cutter, 2013). Health-related hazards including pandemics and other man-made hazards, do not have natural boundaries and have the potential to become disasters that could strike anywhere at any time (Cutter, 2013).

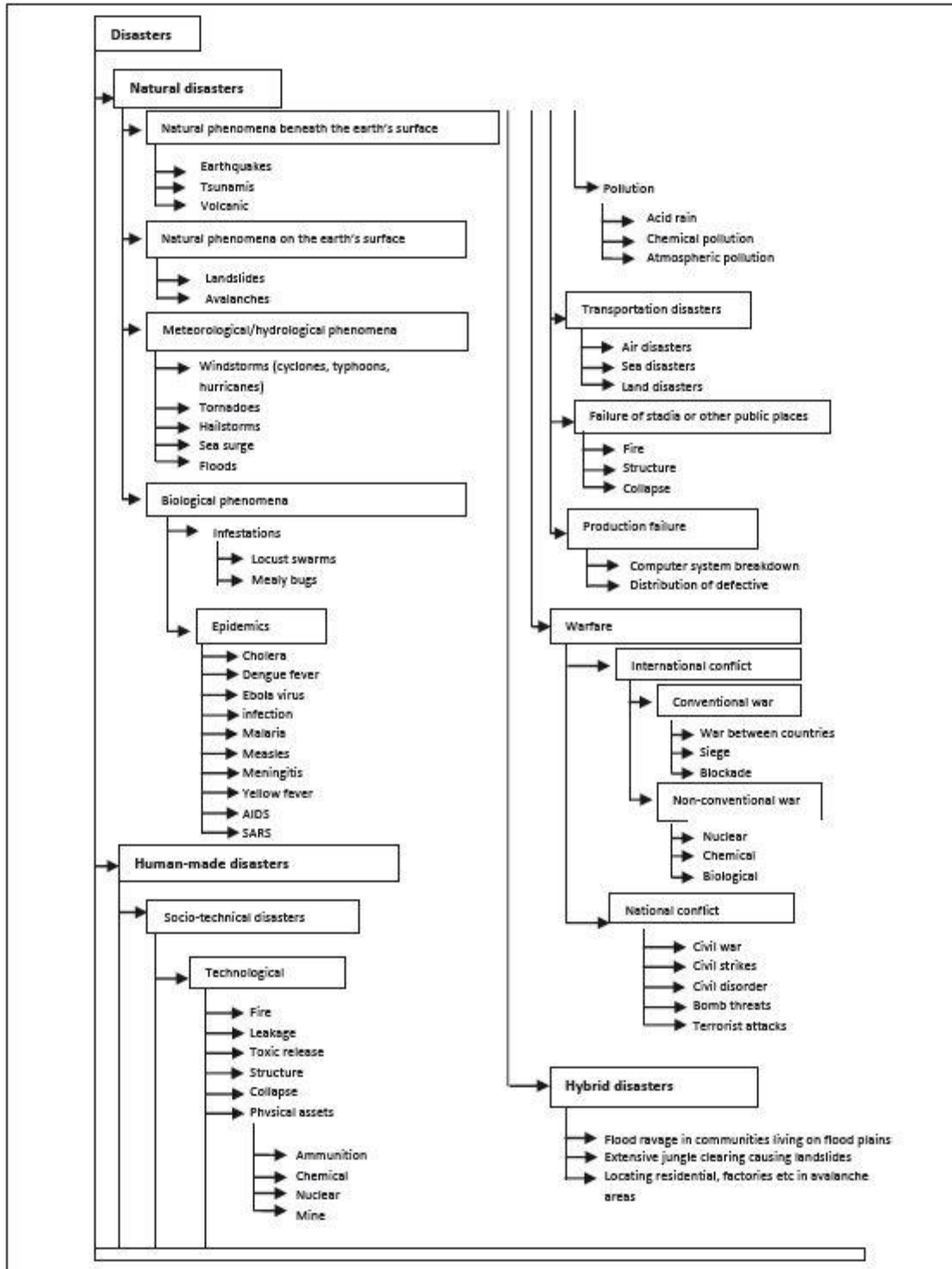


Figure 1. Disaster tree depicting an overview of disaster types. Adapted from “An Overview of Disasters,” by I. M. Shaluf, 2007, *Disaster Prevention and Management*, 16, pp. 699-701. Copyright 2007 by Emerald Group Publishing Limited.

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Natural events are not modern concepts. They have occurred since the formation of the Earth. However, natural disasters are a more modern concept. These natural disasters and emergencies occur in every part of the world. No country, village, or individual is free from the possibility of being affected by some form of natural phenomena; in fact, everyone is at risk to some degree whether that potential is great or small. With the continual increase in world population and population density, more and more humans are being affected by these natural hazards every day. As figure 2 below illustrates, from 1980-2008, the Americas experienced 2,101 natural disasters, which affected 165,729,935 people and resulted in 154,662 fatalities (Centre for Research on the Epidemiology of Disaster, 2009a). During that same period, Asia experienced 3,341 natural disasters that affected 4,742,092,443 people and resulted in 1,144,006 fatalities (Centre for Research on the Epidemiology of Disasters, 2009b).

Region Profile for Natural Disasters from 1980-2008 (Americas)

No. of Events	2,101
No. of People Killed	154,662
Average Killed per Year	5,333
No. of People Affected	165,729,935
Average Affected per Year	5,714,825
Economic Damage (US \$ x 1000)	604,210,264
Economic Damage per Year (US \$ x 1000)	20,834,837

Region Profile for Natural Disasters from 1980-2008 (Asia)

No. of Events	3,341
No. of People Killed	1,144,006
Average Killed per Year	39,448
No. of People Affected	4,742,092,443
Average Affected per Year	163,520,429
Economic Damage (US \$ x 1000)	675,457,207
Economic Damage per Year (US \$ x 1000)	23,222,662

Figure 2. Regional disaster statistics for the Americas and Asia. Adapted from “The International Disaster Database”, by Centre for Research on the Epidemiology of Disasters, 2009.

As these statistics indicate, the impact of disasters is significant, with Asia receiving a greater share of the impact. This has implications for the examination of disaster preparedness domestically and within the Philippines as an Asian country. With proper planning and preparing, the number of people impacted by disasters could be reduced in the future. If the population were well educated on

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what to do before, during, and after a disaster occurs, they would thus be less likely to find themselves in unnecessarily dangerous predicaments. A family can increase their chances of survival in the aftermath of an event that severely affects their community's resources by properly creating a readily accessible disaster kit of emergency supplies that lasts for three days.

According to the Federal Emergency Management Agency (FEMA), preparedness is part of their goal for "a secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk" (FEMA, 2014a). Preparedness is not only the responsibility of a nation's government, but is also the responsibility of every community and the citizens who are part of that community, including children.

Important Terminology

For the purpose of this research, several terms need to be defined. Children or youth refers to those who are of school age (5-18 years old). According to Sabates-Wheeler et al. (2008), hazards are potential events that can negatively affect the well-being of a community. Communities can prepare themselves for these hazards so that they may prevent loss of life and property (Shaluf, 2007). If a community is overwhelmed, these hazards could become disasters. Disasters take place when a man-made or natural emergency or event causes a level of damage that surpasses one's capacity to react and respond without aid and reinforcement (Brooks, 2012; Hassmiller, 1996). The inability to respond without external assistance often happens when the vulnerabilities of a community are not addressed before the occurrence of a hazardous event. Figure 3, on the following page, shows some of the conditions needed to create disasters. Of note, these conditions include a lack of preparatory efforts in a variety of forms, to include those efforts examined in this study.

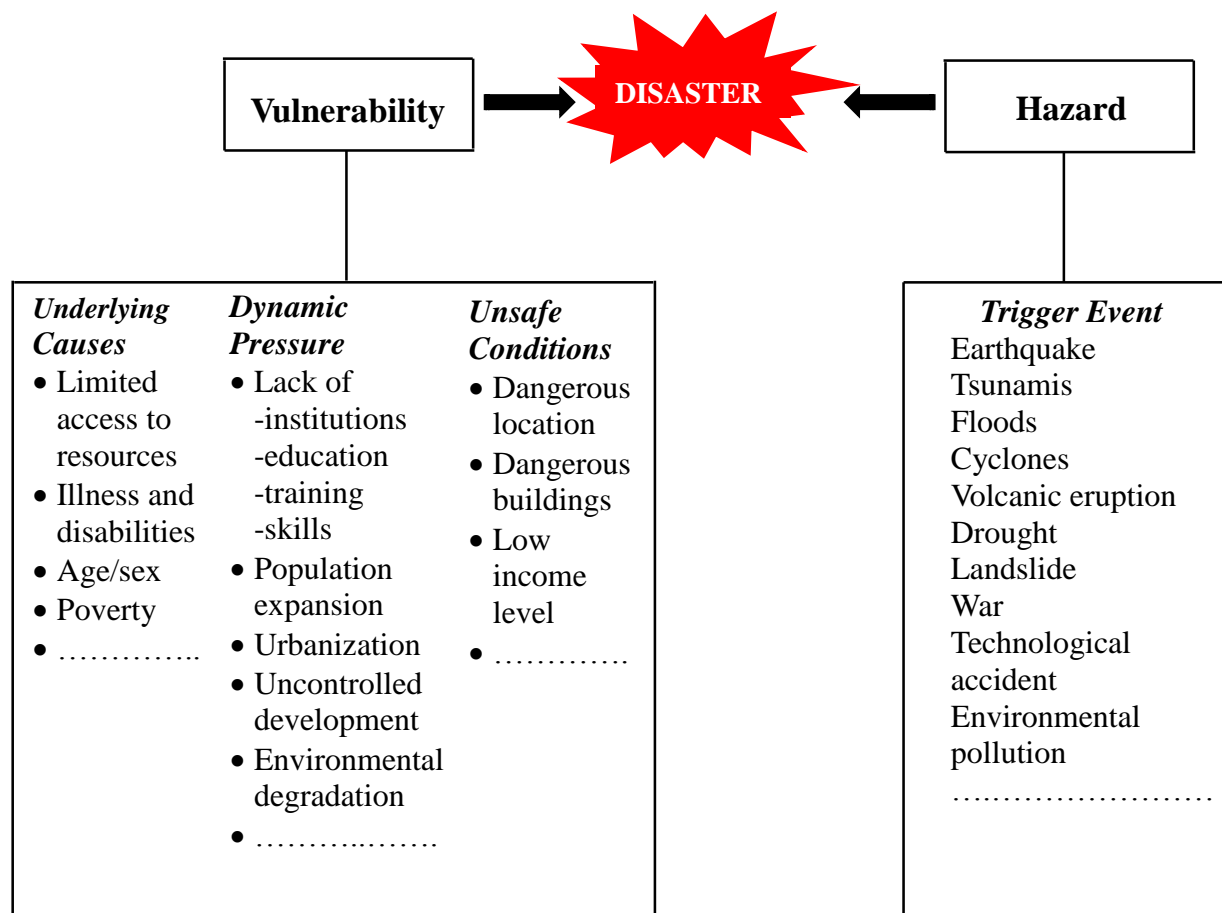


Figure 3. Conditions needed to create disasters. Adapted from “Natural Hazards and Disaster Management”, by Central Board of Secondary Education, 2006, pp. 3. Copyright CBSE, Delhi.

Disasters can cause injury, loss of property, or loss of employment, affecting the lives of humans and their ability to support themselves. The potential effects following the impact of a natural hazard are known as disaster risk. This type of risk could be expressed through health status, assets, services, or loss of life if a disaster strikes (Tuladhar et al., 2015). Risk can be combatted by disaster preparedness. Disaster preparedness is defined by the Department of Homeland Security (DHS) and FEMA as “a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action in an effort to ensure effective coordination during incident response” (DHS, 2015). Three of these cited efforts, including organizing, training, and equipping are relevant to this study on best DRR education practices.

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Communities, states, and countries are trying to thwart the effects of a natural hazard from becoming a disaster by mitigating, preventing, and preparing for an event through the development and application of policies, strategies, and practices known as disaster risk reduction (DRR) (United Nations Office for Disaster Risk Reduction [UNISDR], 2010b). According to the UNISDR, DRR is defined as “the concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters” (UNISDR, n.d.p). The DRR approach identifies hazards and assesses risks; develops and applies practices that prevent, mitigate, prepare for, or recover from disasters; and evaluates the effectiveness of the current programs and strategies (Cutter, 2013). Accomplishing the DRR approach involves focusing on a community’s vulnerabilities such as the structural engineering of buildings and bridges, the cultural perceptions of risk, socioeconomic factors affecting preparedness and response, and the management of government and emergency organizations (Bang, 2013). Once the disaster risk has been identified and assessed, the DRR approach is followed through by actions taken to minimize or reduce that disaster risk through mitigation or preventative measures (Tuladhar et al., 2015). Furthermore, DRR includes *disaster preparedness* as well as *sustainable development* (UNISDR, n.d.p). For the purpose of this study, the two terms will be used interchangeably.

Data Evaluation

Natural hazards and disasters have been occurring for centuries, and they are an increasingly important issue across the globe. The issue has led to the creation of organizations such as the United Nations Office for Disaster Risk Reduction (UNISDR) and disaster policies such as the Climate and Disaster Resilient Strategy for the Pacific. The occurrence of disasters and the losses from these events have been increasing for more than a century and “have grown exponentially in recent decades” (Hewitt, 2013, p. 1). Of the global population, 64% have been affected by a disaster in one way or

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another during the last two decades, half of which are from “fragile or conflict-affected countries” (Global Network of Civil Society Organisations for Disaster Reduction, 2013, p. 6). From 2000-2010, more than \$960 billion in damages to property and infrastructure and over 780,000 lives were lost as a result of natural disasters (Guha-Sapir et al., 2010; UNISDR, 2010a). These economic and physical impacts are due to the growth of disasters in every aspect including number, scale, and intensity (Bang, 2013). Projections based on current trends are predicting that by 2050, damages per year will cost over \$300 billion and 100,000 lives each year will be lost due to disasters (IFRC, 2009). The growing numbers and statistics support the growing interest in DRR. DRR has become a recognized approach in many countries to establish a method to deal with impending disasters. Most countries have created some type of agency or organization to manage disaster response and DRR efforts (Bang, 2013). These agencies serve as sources to provide information for this study.

Disasters can have many effects on people and the environment, which include but are not limited to injury, death, disrupted services, loss of property, or changes in landscape. Natural disasters ravage communities indiscriminately. They do not possess emotions, biases, or prejudices, and they do not pick the communities they are going to hit or the communities they are going to spare. Yet, people living in poor, disadvantaged areas and countries are more greatly affected by a disaster. These effects only continue to add to the economic and social strains of those responsible for the well-being of the community and also influences their sustainability in the short- and long-term (Gall, Borden, Emrich, & Cutter, 2011). Wealthier, more industrialized nations have seen an increase in the economic losses following a disaster but not an increase in the loss of lives (World Bank & Independent Evaluation Group [IEG], 2006). In some cases, the economic impacts are greater than the human effects but in many regions of the world, the human losses outweigh the economic impacts (Cutter, 2013). The cases that suffer from more human losses than economic losses are often the underprivileged communities

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that were more vulnerable before the disaster. Of the world's lives lost due to disaster in the last 20 years, 95% have been from developing countries (Global Network of Civil Society Organisations for Disaster Reduction, 2013). This data provides some insight into the selection of a developing country as a subject in this study.

One of the reasons for the aforementioned results is due to the expanding populations of vulnerable people and property who do not have effective measures in place to prevent or protect them against disaster risk (Hewitt 2013; United Nations Development Program [UNDP], 2004). Rapid urbanization and the increase in migration to coastal areas where climate change has had a negative effect on the area are continuing to put more people in vulnerable situations, thereby increasing their disaster risk (Ablah et al., 2009; Cutter, 2013). Of the global population in 2010, 52% were living in urban areas. Most of these urban areas are located in developing countries. This number is expected to reach 60% of the global population by the year 2030 with the majority living in Asia (United Kingdom Foresight, 2012). Moreover, urbanization, the growth of mega-cities, and the impacts of climate change have exposed more people to disaster risk by contributing to the weakening resiliency of cities (Cutter, 2013).

Many mega-cities have informal settlements where millions reside. These are often referred to as shantytowns or slums that are built in hazard-prone areas such as floodplains, and their close proximity allows fires and disease to spread quickly throughout the community (Komino, 2014). People live in these hazard-prone settlements because they are poor, and their voices often go unheard (Rambau et al., 2012). Their living situation is a result of the everyday marginalization of the poor in political, social, economic, and geographical terms (Gaillard, 2007). According to Reid and Vogel (2006), Mgquba and Vogel (2004), Holloway and Roomaney (2008), and Napier and Rubin (2002), these informal communities are more vulnerable than formal, established communities are, and

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experience more loss in the aftermath of a disaster. It is important to note that poor and vulnerable people worldwide who have limited access to public and private resources reside in industrialized nations as well as developing countries (Fothergill & Peek, 2004).

Background

Some people believe that the impacts of a disaster are unavoidable, and surviving a disaster is about random chance or luck. This belief comes from some experts in the field and the media coverage that surrounds an event (Hewitt, 2013). However, research from many experts and leading agencies in the field support the belief that damages can be avoided, and the media stories that focus on the effects of the disaster do not see the more impactful social issue of poverty at play (Bankoff et al., 2004; Hewitt, 2012; IFRCRCS, 2004). The images shown on television and in newspapers are predominantly of damage suffered in impoverished sections of the community or country, or in other words, the populations that were already in a vulnerable state before the event.

The experience that impoverished people face with regards to disasters only increases their vulnerability, because their poverty only increases with each case and does not allow them the economic opportunities of which the wealthier communities are able to take advantage (Bongo et al., 2013). The communities' efforts to further develop themselves are thwarted when they are tasked with spending money on response and recovery from a disaster. These funds are used to rebuild, often only to the level of the pre-existing condition that was already vulnerable; hence, these communities are frequently stalled in their efforts to improve and attempt to escape poverty. In the end, livelihoods are destroyed, community assets and services are destroyed and in need of rebuilding, poverty has increased, and repopulation continues in pre-existing high-risk areas with no funds or plans to rebuild themselves into a more efficient or resilient community (Cutter, 2013). Many communities are focused on bouncing back and returning to a pre-disaster sense of normal. However, many researchers are

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pushing a new sense of thinking as to where the communities will look at future resiliency, and are working toward “bouncing forward not bouncing back” in order to create a new sense of normal (Coaffee et al., 2008; Manyena et al., 2011; O’Brien et al., 2009).

The interdependence of communities and countries and the globalization of society have caused localized disasters to become a global event that feels the secondary effects (Cutter, 2013). This is undertaken through media coverage, as well as more globalized human connections. In addition, technology has afforded people the ability to expand the network of people they know more than ever before. Globalization, technology, and this sense of connection with people on the other side of the world can lead people to feel social and/or psychological impacts of a disaster even if they were not physically affected. These factors support the need for DRR education and the coping skills. The skills that are taught to prevent psychological stress or trauma can assist those who felt the impact outside of the affected area.

Common Misconceptions/Beliefs

Misconceptions or incorrect beliefs about disasters can prevent people from preparing themselves to their greatest capability. It could even cause more harm if misinformation leads them to do the opposite of what they should be doing in a certain situation. For example, many people believe that they should stand in the doorway when an earthquake occurs. Today, people are told to avoid doorways because the door itself could be swinging wildly during the earthquake and could knock out or harm someone standing in the doorway. It could also pose a threat to safety if several people are in the room headed for the same doorway. A classroom full of students, or a conference room full of business professionals trying to stand in the same doorway will not only be unable to fit, but it may cause panicked violence or a stampede. These situations can be avoided if people are properly informed to stay away from doorways during an earthquake and are given safer places to hide during

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an event should there be a risk that they could be impacted. Misconceptions and outdated information are some of the reasons that the study of best practices is necessary for more effective DRR education.

Misinformed reactionary efforts are not the only causes that could increase the potential of harmful situations. Some people tend to have the mindset that disasters always happen somewhere else, to someone else. Therefore, they do not see or altogether ignore the need to prepare for a disaster (Counts, 2001). A person's perception of risk can play into how he or she may or may not prepare for an event. According to Mileti and Peek (2002) and King and Tarrant (2013), the perception of risk will lead to either a lack of action, or will instead motivate someone to prepare. Having a realistic awareness of potential events is crucial when motivating someone to follow through with the process of preparing (Shaw et al., 2013). According to Counts (2001), without having personally experienced a disaster, many underestimate the potential impacts and losses accrued. However, King and Tarrant (2013) noted that experience with a disastrous event is not necessary, as education can provide the knowledge and perceptions of events that assist someone in coping. The perception of risk and a person's confidence in his or her family's ability to not only survive but also cope with an event are linked to preparedness levels for an event, as they are motivating factors when deciding whether a person should prepare his or her family (King & Tarrant, 2013). Perception of risk as a motivating factor indicates that a certain amount of fear among those who may be affected by the event can cause a sense of self-preservation, thus leading to preparedness and other protective behaviors (King & Tarrant, 2013).

Perception of risk not only depends on the potential of the next event, but the past history of events in that community, too. The more recent the disaster in an area, the more urgency is felt in that community. Brooks (2012) explained this fleeting sense of urgency as the Dopplarian effect of disasters:

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Think of a disaster like an approaching train and you're standing on the train platform. You can feel and hear the vibration of the train approaching, and as it hits you, it's the most intense, but as it passes the train platform, it becomes a distant memory. It fades off, and we forget about it. A disaster is the same way. . . we spend a lot of effort and time and money after a major disaster to be better prepared, but the further we get away from that major disaster, the less importance we place on preparedness because it becomes a distant memory. . . until the next disaster. (p.30)

Importance of Preparedness

The responsibility for disaster preparedness belongs to everyone and not just the government. According to UNESCO (2007), ISDR (2008), Fothergill and Peek (2004), Paton and Johnston (2001), and Hosseini and Izadkhah (2006), there is a positive correlation between a community's knowledge and preparedness and their resiliency in the face of disasters (Rambau et al., 2012). Getting involved and taking ownership of one's part in their own, as well as their family's, preparedness is important (Brooks, 2012). The importance of responsibility does not stop there: to improve disaster preparedness and resiliency, all levels of government, individuals, families, the private sector, and communities must all play a role (Cutter, 2013). According to Cutter (2013) and Brooks (2012), taking responsibility requires an approach that involves top-down and bottom-up efforts that include everyone "from the federal level all the way down to Joe Q. Citizen" when it comes to preparing for and responding to disasters (Brooks, p. 28). Therefore, planning and preparedness is a shared responsibility, and working together toward a common goal can assist in identifying needs and gaps in disaster education and preparedness. Efforts should be complimentary and should not work against each other (Cutter, 2013). Communication and collaboration among all parties helps to avoid the duplication of services, eliminates misinformation, and strengthens and expands the community's network in all phases of disaster management.

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If a state or country is too overwhelmed with relief efforts after a large-scale disaster strikes, then the government may decide to request humanitarian aid from international partners and organizations. Smaller disasters are to be taken care of domestically. This responsibility reiterates the importance of domestic mitigation and preparedness in order to counteract the potential resources that would be used in relief efforts, which in most cases are already limited (Komino, 2014). Involving civil society in preparedness can relieve some of the stress from local and state governments. According to the Peace Boat Disaster Volunteer Center (PBV) in Japan, pro-active community groups participating in all phases of DRR can severely affect areas that are prone to disaster (Komino, 2014). These community groups include those of a formal and informal nature, and both of which are critical when it comes to preparing a community for disastrous events (Komino, 2014). After all, who knows the area and the community better than the locals do? No two communities are alike physically, socially, and economically. While the need for disaster preparedness is being increasingly acknowledged with every event, there is no single way to prepare or even test preparedness (Ablah et al., 2009). Every community is different, and there is no one answer when it comes to planning and preparing for disasters. Getting local residents involved in all aspects of DRR including educating, planning, preparing, practicing, and adopting or changing disaster policy will greatly contribute toward the community's resilience (Cutter et al., 2012).

With the current frequency and intensity of disastrous events only continuing to increase, one cannot say enough about how important it is for communities to build toward disaster resilience (Bongo et al., 2013). In light of this, to lessen the impacts of disastrous events, planning ahead is necessary (Counts, 2001).

Frost-Killian (2008) sums up the importance of understanding our natural world with regards to natural disasters in the following quote:

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As we go about our daily business, the solid Earth seems safe enough, but there's far more going on beneath the surface than meets the eye. Things can change in a devastating flash through floods, earthquakes and other disasters that displace or kill whole communities of people. The more we understand the natural forces that control the familiar landscapes of water, rocks and soils the better we can calculate- and minimize- the risks to people and property. (p.28)

This quote emphasizes how people may not always see the warning signs of an impending disaster and how quickly things can change. Frost-Killian (2008) also mentions that better understanding and education can assist people in finding ways to minimize the potential risks of a disaster. One way to minimize risk is planning. Although planning ahead is not an easy task, it is necessary to achieve positive results, and it is becoming more morally and economically essential after every event (Cutter, 2013; Randall, 2006). Preparing for disasters can reduce potential damage and save lives, which can assist in the speed and efficiency of recovery efforts (King & Tarrant, 2013). Planning and preparing for disasters is an ongoing process. Once an official plan is written and no longer a living document, it essentially becomes useless as conditions are in a constant state of flux (Brooks, 2012). Things change. For example, there may be construction on a road that is part of an escape route, or a secondary shelter may have been severely damaged by a disaster; such changes require flexibility and continual planning.

To get more citizens involved in disaster planning at the local level, they need to be provided with preparedness education. Education has already been proven critical in reducing the number of those affected or killed in future events (Arrieta et al., 2008; Blessman et al., 2007; Boscarino et al., 2006). In many cases, proper disaster preparedness education has been attributed to saving many lives (Ablah et al., 2007; Balluz, 1997; County of San Diego, 2007) while inadequate preparedness has cost many people their lives (Aguirre, 1988; Atkins, 2005; Franco, 2006; Gheyanchi, 2007; Mair, 2005;

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National Oceanic and Atmospheric Administration, 2008; Quinn, 2006). Ablah et al. (2009) conducted a study in an effort to determine the factors that were most likely to foretell an individual's disaster preparedness (2009). Those who responded from the five states included in the study were rated based on how many of the six actionable preparedness measures they satisfied from the 2006 Behavioral Risk Factor Surveillance System (BRFSS). 78% of the participants felt that they were prepared for a disaster, however, only 45% were actually prepared when measured objectively. The study not only concluded that a participant's age and income played a role in predicting their preparedness, but that there was a lack of preparedness and a disparity between perceived and objective preparedness (Ablah et al., 2009). The respondents' misconceptions of preparedness, along with the overall lack of preparedness indicated by the study, emphasize the importance of appropriate disaster education. With proper education related to disaster preparedness, the disparity between respondents' perceived and objectively measured preparedness would decrease.

Educating local residents can empower citizens to take responsibility for themselves and their own families before, during, and after the occurrence of a disaster. This will reduce many people's needs for the government, which often becomes an undue burden during times of emergency when resources are limited. When people are empowered to take responsibility, the government can more effectively focus its efforts on some of the more vulnerable populations such as the sick, injured, elderly or others in need of special assistance (Brooks, 2012).

While education is very important, taking action is also critical. Preparedness campaigns that include actions such as building a disaster go-kit and practicing family emergency plans, on top of considering the social environments of individuals were more likely to create a behavioral change toward individual preparedness than education-only campaigns (Bandura, 2004; Conn et al., 2008). According to the social cognitive theory, people will not be motivated to take action and change their

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behaviors unless they believe it will produce the desired effect. People need to believe that their actions are worth the effort or they will give up on their goal of preparedness at the first sign of resistance or difficulty. The social cognitive theory can be applied to DRR measures. Without an incentive, such as saving one's home or one's life, people are less likely to change their behavior and implement preparedness and/or protective measures.

The lack of protective measures and vulnerabilities present before an event are the deciding factors in who survives or dies, and also the level of damage caused (Hewitt, 2013). The risks people face from potential hazardous events are connected to the involvement of society in all phases of a disaster, but most importantly, the risks are connected to the preparation beforehand (Hewitt, 2013). Current disaster policies use short-term thinking by reacting quickly in order to respond and rebuild a community to the same condition they were in before the disaster, instead of considering a long-term approach that invests in building a disaster-resilient community that can better withstand future events and reduce costly impacts. The longer-term approach will often take longer and be more expensive upfront but will have a better financial and social return down the road (Cutter, 2013).

Children and Disasters

When a disaster strikes, many people are at risk of being affected. From a demographic perspective, it is typically the vulnerable populations who are affected the most. Children are also considered to be one of these vulnerable populations. Children who witness a disastrous event are forced to deal with a plethora of life-changing situations that include changing schools, losing friends or pets, losing their home and personal belongings, relocation, and the sudden interruption to their family and community (Silverman & La Greca, 2002). As a result, these children are more at risk of developing psychological and social health problems due to their experience. According to a post-Hurricane Katrina survey conducted by Osofsky and Osofsky (2006), "more than half of the children in

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heavily affected areas in Metropolitan New Orleans needed mental health referrals for evaluation: 13% requested counseling; 37% reported experiencing loss or trauma; and almost 40% reported feeling depressed, angry, or sad” (Osofsky & Osofsky, 2006, p. 2). Similar findings can be found after other disastrous events.

The psychosocial effects that children experience after a disaster are the focus of the bulk of literature on the role of children in disasters (Norris et al., 2002; Ursano & Norwood, 2003). However, many practitioners are discussing a more positive connection by bringing “the merits of communicating and educating children about their risks of natural hazards for preparedness” to the table (Ronan & Johnston, 2005). Investing in children and involving them in the process of education and preparedness has the potential to benefit their future psychological and social well-being. Child-centered DRR (CC-DRR) is a new approach dedicated to bringing children into the fold and allowing them to be a part of their own protection and safety. Additionally, given the social location of children in schools, children have the potential to serve as conduits for disaster mitigation, preparedness, response, and recovery information dissemination, among both their peers and other household members (Wachtendorf, Brown, & Nickle, 2008). Including disaster preparedness and risk reduction in school curriculum not only involves children in the process but also provides the greatest degree of accessibility.

Psychological and Educational Risks

In the aftermath of a disaster, it is easy to see the physical effects left behind, such as damaged or destroyed infrastructure or fatalities. However, disasters also cause many emotional and mental effects, of which the impact is often worse directly following the event. One such mental effect concerns symptoms of post-traumatic stress including shock, anxiety, guilt, numbness, sleep, changes in appetite, issues concentrating, concerns over the future, and the declension of health (Counts, 2001).

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Fear is a typical emotion when experiencing something out of the ordinary, for example, a disastrous event; furthermore, fear often elicits the survival instinct of the fight or flight response (Greenberg, Carr, & Summers, 2002; King & Tarrant, 2013). Because of where children are in their cognitive and emotional development, they are more prone than adults are to feeling a sense of distress in the wake of a disaster (Ronan & Johnston, 2005). Situations of urgency, stress and fear can cause children to panic, and their manageability becomes increasingly difficult (Hassanain, 2006).

How children respond to disasters can be influenced by those around them. Johnston, Ronan, Finnis, Leonard, and Forsyth (2011) conducted an investigation to determine children's understanding of natural hazards seven months after a significant earthquake in New Zealand. This investigation involved 71 children of 9-11 years of age. Of those just thinking or talking about earthquakes, 51% showed signs of being upset; 30% thought that it would upset their parents to talk about earthquakes. Another study conducted by Ronan and Johnston (2003) determined that the children's emotional response seemed to be connected to their perception of whether their parents would be upset. People in close proximity can often emotionally influence the behaviors of those around them. The children's emotions were more likely to reflect their parents' or caregivers' emotions because of this influence; therefore, being able to remain calm, and providing a positive example of coping is important, as a child often mirrors his or her parents. By displaying a calm and confident appearance about disasters and protective measures, the child is more likely to remain calm and confident, and experience less stress in the face of a disastrous event. If the adults close to them express fear and stress, then a child is more likely to mirror that experience and be at risk of psychological trauma in the aftermath of the disaster (Ronan & Johnston, 2003).

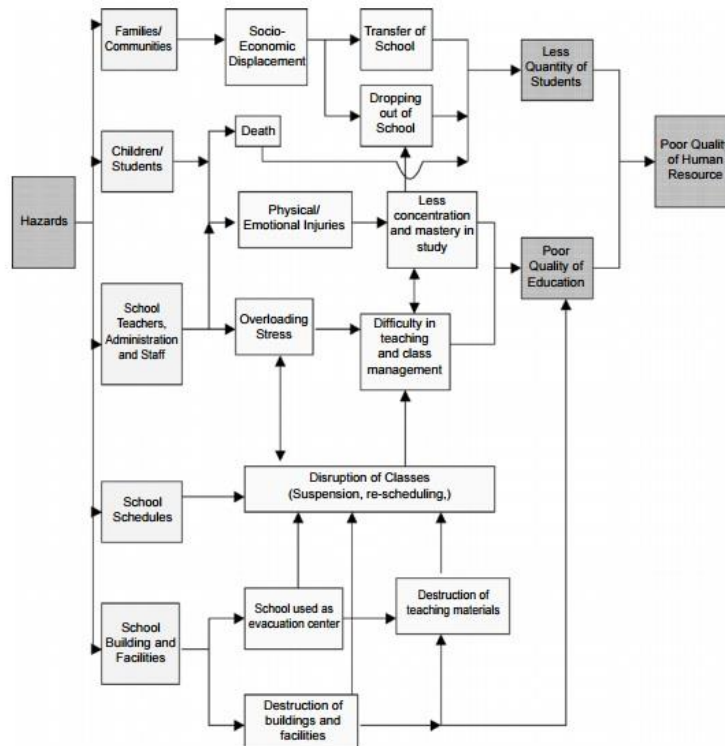
Children do not only receive these cues from their parents, but also from other adults, role models, and media coverage. While it is impossible to control everything a child sees or hears, it is

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important to recognize a child's response and make sure that the child has an appropriate and accurate understanding of the information or situation (King & Tarrant, 2013). In addition, the repetition of information aids in memory and recall for both children and adults (Lehmann & Hasselhor, 2010). If negative information is provided to the child again and again, then he or she may end up believing that disastrous events occur more frequently, or are more dangerous than the reality (Comer, Furr, Beidas, Babyar, & Kendall, 2008). In the same sense, the repetition of positive information or lessons can aid a child in learning and remembering disaster preparedness and coping skills (King & Tarrant, 2013). Coping skills are an important part of disaster preparedness that can help reduce or eliminate the stress and psychological risks that often occur after disasters. Having the ability to cope also assists those affected in managing their fear and getting through a potentially traumatic event that can cause symptoms that influence the actions or behaviors of everyday life (Duncan, 1996). These skills can help adults and children avoid negative thoughts, which could lead to depression (Abela & Hankin, 2011).

As shown in Figure 4 on the following page, there are many ways that disasters can impact a child's education. The physical facility in which children are taught could be damaged or destroyed, thus leaving children with no space to learn. An educational building may also be reallocated as an emergency shelter in the aftermath of an event, which could temporarily or, in some cases, permanently suspend the education of the children who attend that school. An institution may try to find a suitable substitute to hold classes while the school is assessed or reconstructed. These alternatives often lead to less than conducive settings for learning, thus children may struggle in these environments. Consequently, the quality of education often decreases and results in a poor education. Additionally, students may be dispersed to other schools, disrupting their lives as well as their families' lives when

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trying to find safe transportation and the extra time to travel to and from a school that is farther away. The inaccessibility of a new school or stressful learning environments cause many children to drop out of school in the wake of a disastrous event. Also, disasters can lead to people and families uprooting their lives and moving to other towns where children will continue their education in a new environment with new peers (Asian Disaster Preparedness Center, 2007). Preventative measures to protect school facilities and inclusion of DRR efforts to protect the lives of children could thwart disruptions to their education caused by disasters.

Figure 4. Education disruptions caused by disasters. Adapted from “Mainstreaming Disaster Risk Reduction in the Education Sector of the Philippines”, by Asian Disaster Preparedness Center, 2007, p. 59. Copyright 2008.

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Children, Schools, and Education

Knowing and understanding how to prepare for a disastrous event is important for everyone to know whether he or she is a resident of the town, a visiting professional, or a tourist. Events can happen at any time of the day or night, which means a person could find himself or herself dealing with a disaster at home, work, school, the grocery store, out running errands, on a business trip, or on a vacation. It is important to know what to do to remain safe in each situation. In order to remain safe, the public needs to acknowledge that disasters are dangerous, that they are increasing in frequency and have the potential to happen to them. Thus, creating a culture of preparedness is necessary. Remaining safe requires preparedness plans and protective measures. Using education, active steps, and drills to ingrain preparedness into the individual, community, and country is critical so that preparedness efforts become as natural as getting dressed in the morning. Finding outlets to spread awareness and knowledge is where children and schools can play a vital role. Schools provide a platform for disaster preparedness and disaster education programs that have the potential to foster a culture that creates a “disaster-aware generation” (Tuladhar et al., 2015). Educating children can also carry over into the home and influence family members and those around them (Evans & Oehler-Stinnett, 2006).

Children participate in practice drills at school so that they know what to do if a disaster occurs while at school. Since children spend approximately one-third of their day at school for five or six days per week for the majority of the year, it makes sense to practice and involve them in the process of preparedness when they are at school. However, what about the other two-thirds of their day, the weekends, and school breaks? The knowledge needs to carry over to their homes as well. By using classroom time to teach children what to do when they find themselves in a situation outside of school, the chances of a child using that knowledge to help save himself or herself or his or her family increases. Integrating disaster preparedness and disaster education into the curricula at school will

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reach the greatest concentration of children at once, and its status as a state institution allows the opportunity for the information to be fairly consistent across the state or country (Tuladhar et al., 2015).

According to International Strategy for Disaster Reduction (ISDR; 2007), the education of school children is critical in order for them to be prepared and show resiliency when confronted by an event (ISDR, 2007). Finnis, Johnston, Ronan, and White (2010) conducted a study in the Taranaki Region of New Zealand where the researchers provided questionnaires to teachers in three different locations to pass on to the students. Over 275 of the questionnaires were returned. The results indicated that those students who participated in a program involving hazard education, were more likely to be knowledgeable about protective practices and be prepared at home. The researchers concluded that hazard education benefits the children and the community by assisting in resiliency (Finnis, Johnston, Ronan, and White, 2010). Ronan and Johnston (2003) also conducted a study that showed the positive benefits of including hazard education programs in school. In Ronan and Johnston's (2003) quasi-experimental investigation, they randomly assigned children a condition: the "usual condition" or the "emergency management" condition. Children in the "usual condition" classroom participated in a program involving a reading and discussion. The children in the "emergency management" classroom expanded upon the "usual condition" by adding specific teaching geared towards emergency management and increased the level of interaction between the students and their home. The researchers assessed the children's mitigation and response knowledge, their fears towards hazards, their coping ability, DRR measures taken at home, and their perceptions of their parents' fear related to hazards. Based on the results, Ronan and Johnston (2003) determined that education programs that focus on hazards increase resilience in children and the household. The benefits are particularly evident when these programs involve different levels of the school system, thereby giving the student an

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ongoing education in hazards and disasters (Ronan & Johnston, 2001; Tarrant & Johnston, 2010).

These programs are further effective when the education includes information about what happens before, during, and after specific types of disasters (Finnis, Johnston, Becker, Ronan, & Paton, 2007).

Benefits to Themselves

While there is no way to ensure that there will be no traumatic responses during the life of a disaster event, there are tools and interventions that may assist in this effort (Counts, 2001). King and Tarrant (2013) conducted focus groups of 4 to 5 children aged 9-10 years old from 4 schools in the Wellington area of New Zealand. The focus group protocol was comprised of 15 core questions to assess the children's knowledge of natural disasters, their cognitive and emotional responses relating to the subject of natural disasters, and if there was any presence of preparedness among the children and their families. Analysis indicated that the children believed that their school and their families were prepared with supplies and knew how to remain safe during a disastrous event. When a child understands a disaster, knows how to protect himself or herself against it, and knows how to cope, the chances of the child's ability to manage or work through potentially negative emotions such as fear and anxiety increases. These skills and abilities result in more confident and manageable children who can not only assist with response efforts in the instance of a disaster, but are less likely to suffer from long-term psychological effects. The physical and psychological health of children is an important reason for schools to add or improve their DRR education. The tools necessary for children to gain confidence, knowledge, and coping skills in the face of a disaster can be found in effective DRR education.

During the focus groups, the children discussed their fear surrounding disasters and emphasized that their knowledge of disasters and how to prepare for them were important factors in reducing that fear (King & Tarrant, 2013). Their knowledge allowed the children to believe they had some sense of control over their environment because they learned about ways to protect themselves, and also

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possessed the means to cope with the uncertainty that surrounds disasters (King & Tarrant, 2013). King and Tarrant's (2013) focus groups showed that knowing the correct ways to prepare effective safety procedures were important aspects of the children's disaster education. It also showed that knowing their loved ones were safe and utilizing distractions were important pieces of the children's education (King & Tarrant, 2013). The distraction strategies that the children discussed were their coping mechanisms in order to maintain positive and happy thoughts when facing a disastrous event and not allowing their negative emotions of fear and anxiety to take over (King & Tarrant, 2013).

Coping is an important tool for anyone dealing with stressful or potentially dangerous situations. The ability to cope is especially important for children being one of the most vulnerable populations. Allowing negative thoughts to fester can lead to depression or other mental health issues (Abela & Hankin, 2011). Learning ways to manage and deal with disastrous events, such as the New Zealand children's "distractions," are a vital part of becoming resilient to situations of difficulty (Duncan, 1996). According to Ronan and Johnston (1999), possessing knowledge and information is a critical factor in positive coping that helps children process and deal with disastrous events. Participating in an intervention based on education has been found to be the most effective way of gaining positive coping skills (Ronan & Johnston, 1999). Positive benefits such as coping skills is why DRR or disaster preparedness education programs in schools are important for a child's well-being.

According to Mitchell et al. (2008), Ronan and Johnston (2001), and Shaw et al. (2004), school programs that teach disaster education and disaster preparedness are successful in creating awareness of risk, providing risk perceptions that are more realistic, and motivating actions of preparation. Understanding the potential physical and mental impacts of a disaster is an important part of disaster management and preparedness. It is this understanding that assists in motivating people to prepare their homes and help decrease emotions of fear and anxiety in the face of potential events (Ronan &

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Johnston, 2005). Being prepared for an event at home both physically and mentally can have a positive influence on a child's perceptions and level of fear when they understand and believe that they can survive physically and emotionally, regardless of the outcome (Ronan & Johnston, 2005). The knowledge and confidence needed to assuage a child's fears is something that they can gain through DRR education in school. Knowledge and confidence are important assets when a child is faced with a potentially disastrous event.

Benefits to Family/Community

One cannot discount the socialization of children who participate in school disaster programs (Wachtendorf, Brown, & Nickle, 2008). Effective education programs in schools not only benefit the children who participate, but they are also of considerable benefit to the parents and adults around them, as the children go home and pass along the information they learned at school (Ronan, Crellin, & Johnston, 2010; Shaw et al., 2004). This connection between what is taught in school and what is shared at home is an important aspect of children's education, and further supports the need to have disaster education programs in schools because of the potential to reach a wider target community (King & Tarrant, 2013). Many of the New Zealand students who participated in King and Tarrant's (2013) focus groups talked about going home and making plans and preparations for disasters with their family. Families who become involved with their children in preparing their home are not only able to strengthen their protective strategies and barriers, but can also reduce their child's fear or anxiety by proving the family possesses the tools and skills to survive and cope (King & Tarrant, 2013).

The exchange of knowledge can also extend to a community. In one particular case, the knowledge one girl gained in school saved approximately 100 lives around her when a disaster struck while she was on vacation. Ten-year old Tilly Smith was on vacation on a beach in Phuket, Thailand

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when she recognized the signs of a tsunami. She had learned some of the signs for an impending tsunami in her geography class the week before and was able to warn some of the other tourists around her that day (Rao, 2007). Her education not only saved her own life but also the lives of her family and some of the tourist community.

Current Resources/Actors/Policies

Many organizations have resources designed to educate children and allow them to be a part of reducing disaster risks. FEMA has an entire website (www.ready.gov) dedicated to disaster preparedness that is separate from their regular website (www.fema.gov). Ready.gov provides the public with general information for all types of events as well as disaster-specific information. A special section for kids is designed to be a comic book story where the child can play the hero by following the steps to prepare themselves. There is also an online game that simulates disaster situations, and children can “step into the heart of the action as [they] help the heroes face everything from home fires to earthquakes” (Ready, n.d.). In the age of technology, this information is at the fingertips of many children who possess smart phones or their own computers. However, this knowledge and information does not reach those who do not have access to the Internet nor does it mean that the information is reaching those who do have access.

Ready.gov also provides resources for educators who are seeking a way to teach children of all ages how to plan for and respond to disasters. These downloadable lesson plans are classified into four levels in order to reach different age groups. The levels include early elementary, upper elementary, middle school, and high school. Students become involved through research, games, simulations, discussions, debates, surveys, interviews, and other activities, which allow them to work individually and as teams (FEMA, 2014b). Just like the aforementioned comic book story and children’s game, the lesson plans are available to teachers online, but must first be sought out. Without disaster preparedness

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being a part of the curriculum, teachers are less likely to incorporate it into their classrooms themselves.

UNISDR

With the number of natural hazards increasing and the number of people affected by those hazards continuing to rise, the international community has taken notice. It is no longer enough to have a plan for disaster response and recovery. Many governments and organizations have made it a goal to reduce disaster risk and build toward more resilient communities before the occurrence of a disaster. UNISDR is taking the lead in carrying out these initiatives. This section of the review will describe UNISDR, its strategic vision, and two of the frameworks that it utilizes when working towards improving and implementing disaster risk reduction policies and practices.

As a branch of the United Nations, UNISDR was established in December of 1999 and operates under their mandate, which is stated as thus:

“to serve as the focal point in the United Nations system for the coordination of the disaster reduction and to ensure synergies among the disaster reduction activities of the United Nations system and regional organizations and activities in socio-economic and humanitarian fields.”

(UN General Assembly Resolution 56/195, n.d., p.2-3).

The UNISDR was in charge of overseeing the implementation the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (Hyogo Framework). Adopted by 168 member states of the United Nations, the Hyogo Framework intended to “use knowledge, innovation, and education to build a culture of safety at all levels (ISDR, 2005).” To accomplish this, the Hyogo Framework outlines five priorities for action. Priority 1 calls for making DRR a priority. The priority of focus relevant to this study is priority 3: build understanding and awareness. Priority 3 set by the Hyogo Framework includes DRR education in school curricula

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(International Strategy for Disaster Reduction, 2005). In an effort to achieve Hyogo's priorities, the UNISDR held the second and third sessions of the ISDR Global Platform for Disaster Risk Reduction in 2009 and 2011. They also began the Disaster Risk Reduction Begins at School campaign in order to build safer schools and promote the inclusion of DRR curricula.

UNISDR supported the Hyogo Framework for Disaster Risk Reduction (2005), and now supports the implementation of the Sendai Framework for Disaster Risk Reduction (2015), which was adopted in March of 2015 at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan. The new framework provides a "people-centered" approach to DRR in the form of a voluntary and non-binding agreement over 15 years (UNISDR, n.d.h). The goal is to create a "culture of prevention" (UNISDR, n.d.o). With five regional offices around the world, UNISDR is able to implement the framework based upon the needs and resources of each region.

To carry out the Sendai Framework, UNISDR focuses on "understanding disaster risk, strengthening disaster risk governance to manage disaster risk, investing in disaster risk reduction for resilience, and enhancing disaster preparedness for effective response, and to 'Build Back Better' in recovery, rehabilitation, and reconstruction" (UNISDR, n.d.h). The organization conducts global assessment reports every two years to evaluate progress, assists countries with monitoring and implementing the Sendai Framework, and also creates and leads global campaigns on DRR (UNISDR, n.d.h).

Coordinating the implementation, supervision, and review of what was set forth in the Hyogo Framework, and now, the newer Sendai Framework, is part of the UNISDR's responsibilities. They also organize forums and conferences to gather people together to discuss new information, relevant education, good practices, and policies in disaster risk reduction. These forums and conferences, such as the biennial Global Platform on Disaster Risk Reduction, involve bringing decision makers and

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government leaders to the table and creating platforms at the regional, national, and global levels (UNISDR, n.d.m).

Additionally, UNISDR works to create awareness around the world about the risks people face when it comes to natural hazards and the potential for disaster. This includes spreading the knowledge of why and how they can participate in disaster risk reduction. To motivate individuals, communities, and governments to put in place protective measures that will minimize vulnerability, UNISDR leads campaigns. The Making Cities Resilient Campaign focuses on how governments and cities can make changes to build resilience against disasters, while the One Million Safe Schools and Hospitals Campaign concentrates on creating safer, more resilient schools and health care facilities where a great number of people lose their lives when buildings collapse (UNISDR, n.d.l). Such campaigns make sure those buildings, which often house vulnerable people such as the young or the sick, can withstand natural hazards. A significant campaign day is October 13, which has been named the International Day for Disaster Risk Reduction. Each year centers on a theme or population, such as children, women, the disabled, the elderly, or indigenous knowledge (UNISDR, n.d.g).

UNISDR also advocates for DRR through many channels and interlinked topics such as climate change, gender, sustainable development, and education. By focusing on these areas, vulnerability from the changing climate is reduced, women are empowered, sustainability can be achieved, and knowledge is gained. UNISDR continues to advocate for the work between these areas in order to ensure the most effective ways to reduce disaster risk. In 2004, an inter-agency working group was created for climate change and DRR, in order to contribute pertinent information, gather good practices, advise on policy, and create DRR practices with little to no carbon footprint (UNISDR, n.d.a).

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Women are affected by disasters disproportionately to men often because of cultural beliefs, traditional practices, or socio-economic conditions. Reaching women and empowering them with the knowledge and tools of DRR is a priority for UNISDR. The tools of empowerment they learn could help women and, in turn, their children, to reduce the effects of a disaster and save lives in their communities. UNISDR approaches this through gender-sensitive DRR and working with women's organizations and civil society actors (UNISDR, n.d.e).

DRR is a necessary part of sustainable development. Reducing risks and preventing destructive impacts are about building communities that can withstand a disaster and sustain themselves after an event. Building more than once is costly not only economically but also socially and environmentally; thus, when working in developing countries, it is important to build something that will last (UNISDR, n.d.j). Moreover, sustainability involves thinking about the future and protecting against any threats, including disaster risks.

UNISDR is also a big advocate of education. Education is crucial for spreading appropriate and effective DRR practices. Teaching people how to protect themselves, their families, their homes, and their businesses is an important part of removing risks and preparing for disastrous events. Educational initiatives assist in raising awareness, thereby allowing people to make educated and informed decisions, and motivate action toward installing protective measures. The process of education can come in many forms. For example, UNISDR believes in both formal education through schools and universities as well as informal education through local traditions and knowledge (UNISDR, n.d.d). Several mediums including classrooms, town meetings, computers, comic books, video and board games can be used to convey DRR knowledge. Starting education early allows the best chance to create a culture of preparedness that will be passed through the generations.

Another responsibility of UNISDR is to provide as much information as possible while

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connecting people within their communities and around the world. Some of this spread of information is accomplished through their website, PreventionWeb. The website is a way to find and share DRR information and knowledge (UNISDR, n.d.i). On their website, UNISDR posts tools, services, good practices, country profiles, and the Global Assessment Reports conducted every two years that analyze disaster risk and risk management (UNISDR, n.d.n). The Global Assessment Report is led by UNISDR, but also involves consultation and includes collaboration with several UN agencies, governments, donors, technical organizations and specialists, and academic and research institutions. These reports are used to bring attention to DRR and gain international support both politically and economically (UNISDR, n.d.f). PreventionWeb also includes terminology, data, and statistics on disasters by country and region. The data and statistics are crucial not only to educating the public but also to informing and influencing policy decisions by giving a numerical and tangible measurement of the costs and impacts of disasters (UNISDR, n.d.b). Technology has not only provided ways to measure and present DRR data and statistics, but it has additionally provided a platform through websites such as PreventionWeb where anyone can access information, knowledge, tools, and practices in order to better educate themselves.

UNISDR is part of the wider United Nations system. While their focus is on disaster risk reduction, they are not the only UN organization working in this field. DRR has been included in several UN organizations' strategic work plans for 2014-2017, including the World Bank, the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the UNDP, and the United Nations Children's Fund (UNICEF) (UNISDR, n.d.k). Over a dozen United Nations organizations and agencies have committed to DRR.

Everyone is at risk of being affected by a natural hazard, which therefore makes everyone a stakeholder when it comes to disaster risk reduction. To accomplish their work, UNISDR works with

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many partners from the public and private sectors. Regional organizations, countries, parliamentarians, other UN organizations and agencies, international financial institutions, civil society organizations, academia and research institutes, indigenous tribes, businesses, and even the media assist UNISDR with their mission (UNISDR, n.d.q). The organization's position within the United Nations gives it access to policy makers from member states in every region of the world. These relationships with influential people and stakeholders on every continent are beneficial to UNISDR work. The organization's conferences, campaigns for DRR, advocacy efforts, and informative DRR resources make UNISDR a well-connected entity at the forefront of DRR initiatives. Their responsibilities and connections make them significant to the future of DRR education in school curricula.

Other Actors

UNISDR is not the only organization involved in the promotion of DRR education in schools. UNICEF is an international organization that advocates for the rights of children worldwide. Their advocacy includes supporting the efforts of DRR programs. UNICEF has worked in collaboration not only to “promote safe schools but to teach valuable life skills to children” who, “in turn, communicate these messages to their families and communities” (UNICEF, 2014). To accomplish this requires going “beyond the basic science of hazards and safety measures to consider prevention, mitigation, vulnerability, and resilience building” (UNICEF, 2012, p.17). Many countries have started programs within their schools in order to promote DRR. Those participating include countries from Europe, Asia, Africa, the Middle East, and Latin America. After studying 30 cases, UNICEF and the United Nations Educational Scientific and Cultural Organization (UNESCO) have created a checklist of what they consider to be optimal DRR curriculum practices. This checklist can be used as a resource for analyzing the curriculum of educational systems around the world in order to determine whether the

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current structure is effective. The results of a curriculum analysis would allow educational institutions to make any changes necessary to become as effective as possible.

Chapter Three: Method

Design

Fundamental research was utilized in this qualitative study. An inductive approach was used to conduct conceptual research through non-experimental means. This research consisted of an exploratory study employing program analysis. Content analysis completed this analytical research by way of examining the curriculum from multiple countries' and states' educational institutions, with the intention of determining how involved DRR is within current curriculum.

Operationalization

It is important to operationalize some of the terms that were used for the purpose of this study. Effectiveness was a dependent variable, which was determined by the program information provided by each school. Reliability was ensured by using the same standard rubric format for every participant. Another way to ensure reliability was to include clear, unambiguous language in the elements. The rubric had elements accounting for various types of information including the nominal variables of grade level, cumulative exposure to disaster risk reduction, exposure to multiple hazards, exposure to all stages of disaster risk reduction, the inclusion of climate change education, the presence of learning outside of the classroom, and the involvement of key stakeholders. All of these variables were independent. Grade level was assigned from kindergarten through twelfth grade. The elements of the rubric specifically related to what is present in the curriculum were classified as "yes" or "no" responses.

Population/Sampling Method

The population of interest in this study was the educational curricula of public school institutions around the world. The researcher used a non-probability sampling method, commonly referred to as convenience sampling with the purpose of obtaining a sample population of three

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participating subjects, including two states from the United States, and one subject from outside of the United States to study. The participants from outside of the United States were taken from a pool of countries who have English as an official language. The first available curriculum records were used.

Data Collection Procedures

The data for this study were obtained by gathering the public curriculum records of each subject chosen. Since the records are public, many were found on official government websites and in United Nations documents.

Selection of Subjects

Starting with all 30 countries from the UNICEF/UNESCO case study entitled, *Disaster Risk Reduction in School Curricula: Case Studies from Thirty Countries*, the synoptic cases were eliminated, thus leaving 25 countries. According to the Annual Disaster Statistical Review 2013 (Guha-Sapir, Hoyois, & Below, 2013), Asia had the most occurrences of natural disasters of any continent in the year 2013 with 40.7% of the total. Focusing on this region of the world thereby narrowed down the countries to nine. The Index for Risk Management (INFORM) was used to separate the remaining countries into the four levels of risk: low, medium, high, and very high. Three of the countries were considered to be at high-level risk: Cambodia, Fiji, and Lao PDR and five countries were considered to be at very high-level risk: Indonesia, the Philippines, Myanmar, Bangladesh, and Nepal (INFORM, n.d.). All eight of the aforementioned countries are considered a developing country (United States Agency for International Development [USAID], 2012). The Top 10 charts in the Annual Disaster Statistical Review 2013 (Guha-Sapir, Hoyois, & Below, 2013) assisted in determining which of the countries appeared most frequently. This process of narrowing down potential subjects resulted in the Philippines representing a developing country in the very high-risk level of the INFORM Risk Index. English is one of the official languages of the Philippines used for communication and instruction,

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including education. Using English as the language of communication and data for all of the subjects in this study eliminated the risk of mistranslation and made it easier to compare the curricula studied from the United States.

According to the INFORM Risk Index, the United States represents an industrialized country with a medium level of risk. The United States is considerably larger in terms of size and population. In addition, the curriculum is not determined by the country but by the states. The researcher grew up and attended kindergarten through undergraduate study in the state of Texas before continuing post-graduate study in the state of Oregon. Therefore, out of convenience and familiarity, the states of Oregon and Texas were chosen as examples to represent the United States.

Data Processing and Analysis Procedures

A checklist created by UNICEF and UNESCO of what makes DRR curriculum practices effective was used as a base for the information gained from the gathered curriculum. Each question was answered with a “yes” or “no” response based on the content of the curriculum.

Ethical Considerations and Safeguards

Some safeguards were put in place with the intention of addressing potential ethical concerns. None of the participants were compensated for the purpose of this study. No human participants were involved, which means no informed consent was involved, and furthermore, there was no risk of deception or of emotional or physical harm. Since public records were used, there was no risk of violating anonymity or confidentiality.

Strengths and Weaknesses

By using content analysis as the method for this research, there were many strengths in this study. Content analysis saved time and money by researching records that were already publicly available, which was more feasible than surveys or interviews. Content analysis also allowed the

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researcher to study a reoccurring process over a period of time. Another strength of content analysis was that it did not have any effect on the subjects being studied. It was an unobtrusive measure that took place after the content had already been completed. Reliability of content analysis was high because of the tangibility of the research. The permanency of the content allowed the researcher to code and recode the data and documents in order to repeat the study as many times as desired. The use of public curricula in this study was a strength because records were public and more easily accessible. The ease of accessibility better allows others to duplicate and verify the results found in the study. By only including countries with English as an official language, there was no need to pay for a translator, which helped to substantially reduce the risk of mistranslation and misunderstanding.

This study also has some weaknesses that could be mitigated in future research. Using content analysis meant that the study could only research records that had already been written. The use of established records could limit the research in several ways. There may not have been enough content found to have a thorough enough pool of participants. The information could already be outdated for the purpose of the research. The possible changes and modifications to a program that the study suggests may already be put in place or in the process of being put into place. Another weakness of this study was the possibility that the teachers were not strictly following the curriculum given by their school district. A school could be deemed effective based upon their curriculum, but that would not matter if the teachers in that school were not following those effective practices. The use of public curricula could also be considered a weakness because it was only a representative of the public school system and not the entire educational system including private and charter schools. Finally, focusing only on countries with English as an official language does not allow for representation from those countries that do not use English as an official language.

Chapter Four: Analysis

In order to gain a better understanding of this study's analysis, it is important to consider the background and structure of the education system and curriculum standards in each case. Below is a summary of the education systems for the United States and the Philippines. The United States is then divided into the states of Oregon and Texas, and after discussing the educational structure, an overview of the curriculum standards used by each participant is described. The background of each participant is followed by a detailed response to each individual question from the checklist.

The United States Education System

In the United States, education is compulsory. Depending on the state, compulsory education begins at the age of five or six and ends at the age of 16, 17, or 18 (Corsi-Bunker, n.d.). Students typically start in kindergarten and complete their education when they finish twelfth grade, which is also known as the senior year of high school. Figure 5 on the following page shows how education structure breaks down in the United States based on age and grade level. Students can enroll in public or private schools, or they can choose to be home-schooled as an alternative. School lasts between 6.5 to 8 hours per day, five days per week, for 175 to 185 days per year. The average public school has a summer break between grade levels that lasts approximately 2.5 months between June and August (Corsi-Bunker, n.d.; Wieczorek, 2008).

The United States does not have a standardized national education system, as each state has its own education department. Policies, laws, curricula, teaching, assessments, and funding for kindergarten through twelfth grade are decided by each state. The education system structure is often subdivided further in some states into school districts typically defined by county boundaries or municipalities (Wieczorek, 2008). The school districts are run by locally elected school boards who oversee the application of state laws, policies, and curricula. The school boards for each district

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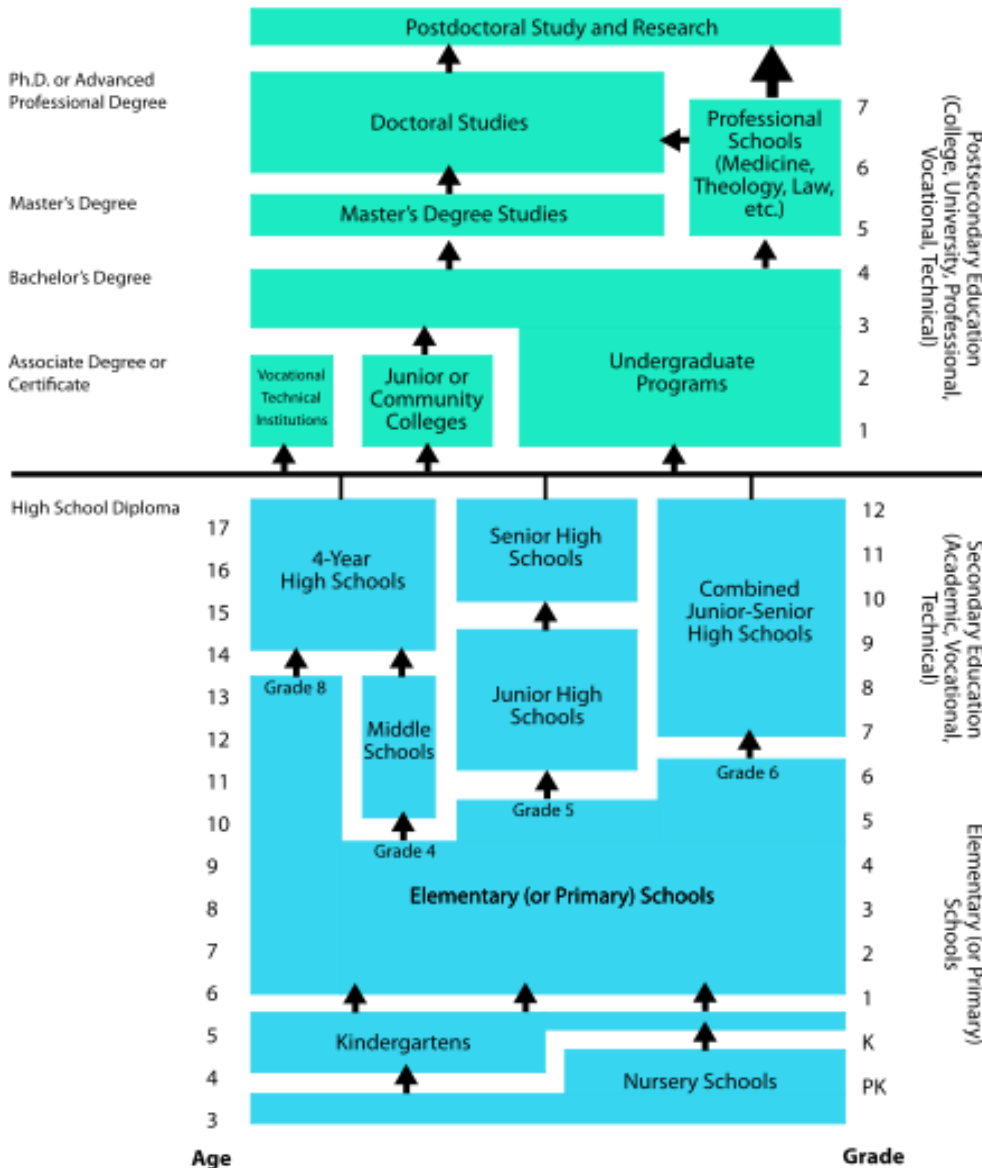


Figure 5. United States education structure. Adapted from “Digest of Education Statistics”, by U.S. Department of Education, 2013.

often further specify policies, curricula, etc., to their local context. The federal government does not have jurisdiction over public educational institutions; these are overseen by the state (Teachnology, Inc., n.d.). This responsibility includes providing the majority of funding for public institutions; however, to acquire any federal assistance, federal law mandates that the state is required to develop and improve its own standards for curricula and instruction (United States Department of Education

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International Affairs Office, 2008).

Due to taxes and funding rendered by the government at federal, state, and local levels, public schools are free to the students (Wieczorek, 2008). Much of a school's funding comes from local property taxes. The amount of funding a school gets depends on the surrounding property values. Poorer areas receive less funding to pay for necessary resources. Schools in more affluent neighborhoods are provided more funding and resources. This dependency for educational funding on varying property values around the city, state, and country leads to varying disparities among schools (Corsi-Bunker, n.d.).

To counter this disparity, the Common Core State Standards Initiative was developed to standardize mathematics and English language arts across all districts and schools. This standard was created in 2009 by the Council of Chief State School Officers and the National Governors Association Center for Best Practices through the cooperation of teachers, administrators, experts, and school chiefs. These standards include guidelines and goals that determine what students should be able to do at the beginning and end of each school year. Their purpose is to decrease and ultimately purge the disparities between state standards in order to provide some consistency with an equal opportunity for high school graduates to succeed in entry-level careers, college, or life no matter from which state they originated (Common Core Standards Initiative, 2015).

The Common Core State Standards are:

- research-based and evidence-based;
- clear, understandable, and consistent;
- aligned with college and career expectations;
- based on rigorous content and application of knowledge through higher-order thinking skills;
- built upon the strengths and lessons of current state standards; and

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- informed by other top performing countries in order to prepare all students for success in our global economy and society. (Common Core Standards Initiative, 2015)

The Department of Defense Education Activity along with 42 states, the District of Columbia and 4 territories of the United States, have already decided to follow the Common Core State Standards. Although these standards do not cover subjects such as science or social studies, many would still argue that Common Core State Standards are a positive step toward a national and standardized curriculum (Common Core Standards Initiative, 2015).

The proponents of a national curriculum for the United States insist that a consistent system would raise the quality of education for students who would in turn provide a positive investment in the nation's global ranking in technology, economy, medicine, etc. To advocates, a clear path is needed to accomplish this in each subject area. Initially, standards need to be agreed upon for each subject designated by grade level. From these standards, the next step would be to develop curriculum and instructional materials. Once curriculum has been established, assessments can be produced to determine the efficacy of the curricula in meeting the set standards (Albert Shanker Institute, n.d.). Nationalized standards would ensure that every student in the United States meets a certain level of knowledge based on grade level and would provide every graduating senior the same tools to be successful in his or her next step whether that is college or the workforce. A nationalized standard would affect the inclusion or exclusion of DRR education. According to the Albert Shanker Institute, a non-profit organization committed to the improvement of public education, a national standard for curriculum should provide 50 to 60% of teachings while the remainder can be filled based upon state, regional, and local subjects of relevance (Albert Shanker Institute, n.d.). To further the effort toward a national curriculum, the Albert Shanker Institute and those who support them, call for the following changes:

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1. developing one or more sets of curriculum guides that map out the core content students need to master the new Common Core State Standards;
 2. involving teachers, content experts, and cognitive scientists—not just curriculum designers by trade—in the development of such curriculum guides;
 3. writing the common core curriculum guides with care and restraint, such that—when taught at a reasonable pace, with reasonable depth—they would account for about 50 to 60% of a school’s available academic time;
 4. including sample lessons, examples of acceptable levels of student work, and assessments that help teachers focus instruction as well as measure student outcomes;
 5. establishing a nongovernmental quality control body, with a governance structure composed of professionals: teachers, content experts, cognitive scientists, curriculum designers, and assessment authorities;
 6. creating state teaching quality oversight bodies to work on linking student standards and curriculum guidance for teacher preparation and development, and to ensure that sufficient resources are allotted to these efforts; and
 7. increasing federal investments in implementation support, in comparative international studies related to curriculum and instruction, and in evaluations aimed at finding the most effective curriculum sequences, curriculum materials, curricular designs, and instructional strategies.
- (Albert Shanker Institute, n.d.)

While some citizens advocate for instating a standardized national curriculum in the United States, as in many other countries, others still believe in giving each individual state the freedom to develop their own curricula. Opponents are particularly against a national curriculum when it comes to more subjective subjects than the Common Core State Standards subjects of mathematics and English

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language arts. One reason for keeping state curricula is the ability to tailor the needs of the state based on its location or history (Teachnology, Inc., n.d.). For example, the Texas-Mexico border dispute that led to a war is a large part of Texas' geography, history, and culture. Thus, it is important for those growing up and living in Texas to learn about this period of history, whereas someone growing up in New Jersey may only touch upon it briefly one day in history class. The same argument could be said of weather and natural hazards. For some areas of the United States, it is crucial to learn about hazards such as tropical storms or hurricanes in order to recognize and prepare for them. Other areas of the country may not require the same amount of time and focus because they are not in danger of hurricanes. Instead, they may need to focus on a regional or local hazard.

Historically, there has been opposition to nationalizing curriculum. One reason for this opposition is affixed to U.S. governance. The United States was founded on the idea of a decentralized government in which the power was divided between the federal, state, and local levels to prevent the federal government from having too much control. The passing of a national curriculum would reallocate the responsibility of education from the states to a federal institution where it would then become a pawn in the political realm used to leverage deals and decisions between lawmakers and lobbyists. Others believe that a national standard would thwart future educational innovation (Education Reporter, 2011). Many do not support the Albert Shanker Institute's push for nationalized curriculum as a credible public policy because:

- There is no constitutional or statutory basis for national standards, national assessments, or national curricula.
- There is no consistent evidence that a national curriculum leads to high academic achievement.
- The national standards on which the administration is planning to base a national

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curriculum are inadequate.

- There is no body of evidence for a “best” design for curriculum sequences in any subject.
- There is no evidence to justify a single high school curriculum for all students. (Education Reporter, 2011)

The topic of whether or not the United States should adopt a national curriculum is still widely debated. There are many citizens who are for the adoption of nationalized standards while there are also many citizens who oppose. This debate not only affects current and future DRR education but the adoption and implementation of all subjects of curricula. As can be seen in the following sections, which focus on the education systems in Oregon and Texas, the states are on opposite sides of the issue.

Oregon Education

Located in the Northwestern part of the United States, Oregon is the 27th most populous state in the country with 3,831,074 people according to the 2010 census (United States Census Bureau, 2010a). Bordered by Washington State in the north, California and Nevada in the south, Idaho to the east, and the Pacific Ocean to the west, Oregon spans 251,419 square kilometers (World Atlas, 2015a).

DRR has been mandated by State officials through state law ORS 336.071. A minimum requirement of 30 minutes every month must be spent teaching students about fire safety, earthquake and tsunami hazards, and evacuation drills. This law pertains to public school students attending kindergarten through eighth grade (Oregon Laws, 2013). The Oregon Office of State Fire Marshall created a resource guide in 2010 in an effort to assist teachers and school administrators with the instruction of hazard information and evacuation drills. Teachers and local schools can then custom tailor the lessons based on their specific needs (Oregon Office of State Fire Marshall, 2010).

The state of Oregon is one of the 42 states that have adopted the Common Core State Standards covering the subjects of mathematics and English language arts. These subjects, however, do not

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typically have lessons that include the topics of natural hazards or disaster risk reduction, as themes related to DRR are more often found in social studies or science. Adopting the Common Core State Standards is significant because the subject of science has recently undergone a change towards standardization that reaches beyond the borders of the state. This change may have positive implications for the future of DRR. Oregon was one of 26 states that worked together to develop Next Generation Science Standards (NGSS). With a unanimous vote by the Oregon State Board of Education, NGSS was adopted as the new standard of science for Oregon in 2014. The NGSS will not constitute an automatic switch from the Oregon 2009 Science Content Standards; rather it will be phased in over time to allow for local curriculum changes, training and professional development, and time for students to learn and practice the content based on the new standards before being assessed. These changes to the science curriculum could affect the future of DRR education in Oregon. Until the NGSS has been completely implemented, students will be tested and assessed based on the Oregon 2009 Science Content Standards (Oregon Department of Education, 2014f). The delay in assessing students' performance based upon the new curriculum means that the effectiveness of the teaching of disaster education elements included in the new NGSS curriculum described later in the 2014 Oregon Science Standards (NGSS) Curriculum section will not be known for years.

Texas Education

Texas is the second most populous state in the United States with 25,145,561 residents as of the 2010 Census (United States Census Bureau, 2010b). Formed in 1845, the state covers 691,030 square kilometers and shares its borders with the states of New Mexico, Oklahoma, Arkansas, and Louisiana, the country of Mexico, and the Gulf of Mexico (World Atlas, 2015b). The Texas Education Agency “provide(s) leadership, guidance, and resources to help schools meet the educational needs of all students and prepare them for success in the global economy” (Texas Education Agency, 2015c).

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The Texas Education Agency oversees the education of more than 5 million students in the state. In 1995, the Texas Education Code was revamped to put more control into the hands of local schools and districts and away from state mandates (Texas Education Agency, 2015a). Unlike Oregon, Texas is one of the states in the minority that has not adopted the Common Core State Standards or the Next Generation Science Standards that are being used by many other states. Instead, Texas has created and adopted its own standards called Texas Essential Knowledge and Skills (TEKS). Current textbooks and resources used to teach students are based on those standards. TEKS defines what knowledge and skills students should be learning and by which grade they should have acquired certain skills. A state test is given to students to assess how well they grasped the TEKS standards (Texas Education Agency, 2015b). The TEKS curriculum will be analyzed for contents related to DRR education in the section, TEKS Curriculum.

Philippines Education

While commonly referred to as the Philippines, the country's official name is the Republic of the Philippines. It spans 300,000 square kilometers and is home to a population of 97.3 million. Located in Southeast Asia in the western part of the Pacific Ocean, it is an island country and does not share its borders with anyone. The country's closest neighbors are Taiwan to the north, Palau to the east, Indonesia to the south, Borneo to the southwest, and Vietnam to the west. The Philippines lies near the equator and is part of the Pacific Ring of Fire, thus leaving the country vulnerable to many hazards, leading the United Nations (2015) to deem it the "third most disaster-prone country in the world".

The current structure of public education in the Philippines consists of six years of primary or elementary school and four years of secondary school before another four years towards earning a bachelor's degree. Students in the Philippines spend 40 weeks in school, starting the month of June and

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ending in the month of March (World Education News & Reviews, 2009). Primary education consists of four years at the primary level and two years at the intermediate level. Students enter grade one at approximately the age of 6 or 7 and complete grade six at the age of 12 or 13. Primary education is compulsory for all children in the Philippines (World Education News & Reviews, 2009). While children are only required to go to school until the age of 12 or 13, though most go on to complete grade 10 of secondary school at the age of 16 or 17. Students are assessed on their progress four times each school year in order to determine if they will continue on to the next year. The first two grade levels of primary education are taught in the dialect most commonly used in that area, while English and Filipino, the country's two official languages, are taught as second languages. Beginning in grade three, English instruction is used in science and mathematics while Filipino instruction is used in humanities and social studies (World Education News & Reviews, 2009). The use of multiple languages in classroom instruction leads to many Filipinos becoming bilingual, if not trilingual.

After finishing their primary education, students can continue on to secondary education. Completion of primary education guarantees children automatic admission to public secondary schools in the country. However, many students choose to enter into one of the private secondary institutions around the country. Students attend one of three types of secondary schools: a general high school, a vocational high school, or a science high school. The curriculum in high school expands to include subjects such as anthropology, sociology, home economics, agriculture, entrepreneurship, citizen army training, music, economics, advanced science, and advanced mathematics (World Education News & Reviews, 2009).

The Philippines' education administrative system went through a restructuring in 2001 due to the Republic Act 9155. The Department of Education, Culture, and Sports (DECS) became the Department of Education (DepEd). The Department of Education consists of the Central Office and the

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Field Offices (Republic of the Philippines Department of Education, n.d.). The Central Office resides over the conception of curricula, the setting of academic standards, the creation of policies, and the efficient administration of the country's primary and secondary education. The field offices are in charge of education administration at the regional and local levels as well as overseeing the implementation of the curriculum, policies, and standards set forth by the central office (Mariñas & Ditapat, n.d.).

The curriculum is more specifically created by the Curriculum Development Divisions of the Bureau of Elementary and Secondary Education, which fall under the purview of the central office (Republic of the Philippines Department of Education, n.d.). Technically, this means that there is a national curriculum for the Philippines. However, the way in which the curriculum is implemented is not up to those at the national level who created it. It is the teachers on the ground who have the ability to adopt how they want to approach and teach the lessons and objectives laid out in the national curriculum. Local institutions also have the ability to adapt parts of the curriculum in order to address issues that correspond to the region or locale (Mariñas & Ditapat, n.d.).

The Philippines is part of the Regional Consultative Committee (RCC) on Disaster Management, a regional coalition of 26 Asian countries who have been working collaboratively in order to find a way to mainstream DRR education into school curricula. The Philippines is one of those 26 countries. Evidence of the loss of children's lives while attending school during a disaster and the loss or inaccessibility of school facilities to provide education in the aftermath of a disaster was a driving force behind not only finding ways to build safer and more resilient facilities, but also to educate the public, including children, on the potential risks posed by natural hazards (RCC, n.d.). The physical safety of school facilities, as well as educating children about disaster risk reduction efforts, are especially important in hazard-prone areas.

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The Philippines, along with Cambodia and Lao PDR, participated in a priority implementation partnerships (PIPs) project to integrate DRR into the education system with hopes of it gathering support for mainstreaming DRR in the education sector, finding additional areas to implement DRR, and creating a module to be used in future integration (Asian Disaster Preparedness Center, 2007). Each country created its own curriculum based on the potential hazards of that country. Being prone to volcanic eruptions, the Philippines tailored the curriculum to specifically include a section to address that hazard (National Disaster Coordinating Council [NDCC], 2008). Led by the Department of Education, the Mainstreaming Disaster Risk Reduction into Development project (MDRD-EDU) was carried out in two phases: January 2007 to April 2008 and September 2008 to December 2009. Data collected from this study assisted in showing the impacts that disasters have on both schools and the education sector. Providing the information gained from this study to government agencies, United Nations agencies, non-governmental agencies, and other stakeholders, assists in gathering their much needed support to secure funding, push for policy reform, and follow through with the long-term task of integrating a DRR curriculum. The Philippines Department of Education, in conjunction with the National Disaster Coordinating Council-Office of Civil Defense (NDCC-OCD), assembled a technical working group (TWG) to assure the project was properly and successfully enforced. The results led to the decision that a new and separate subject for DRR should not be appointed, but rather that it should be intertwined across multiple, pre-existing subject areas. This design would provide a context that is “easier for the children to understand” (RCC, n.d., p.3). It also would allow the opportunity for other educational government initiatives, including food security and global warming, to find places within the curriculum to insert themselves.

A grade seven DRR module for students and teachers was created with lessons in science and social studies by the Department of Education and the TWG. In April of 2009, a workshop was held to

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review and discuss materials and resources from different agencies and organizations around the country to obtain DRR materials that can be used with the grade seven module. The grade seven module included sections on natural hazards, volcanoes, fire, tornadoes, heat waves, family disaster plans, and climate/global change (NDCC, 2008). In addition, several resources were endorsed as official teaching aids that could be used around the country, including the Tales of Disasters DVD and a booklet written in Tagalog about landslides. During both phases of MDRD-EDU, teachers and education supervisors from around the country received training on the use of the grade seven DRR curriculum materials (RCC, n.d.). In December 2009, another workshop was held to discuss how to fully integrate DRR in all grades. The Curriculum Framework Plan was developed as a guide toward spreading DRR education to multiple grades.

In June 2012, a new program was introduced to the education system. The K-12 education program has added universal kindergarten and two years of senior high school to the current education structure of 10 years of basic instruction before university or college. The Philippines is the last Asian nation and only one of three countries in the world to use the basic education system, which consisted of only 10 years (Official Gazette, n.d.; Philippine Daily Inquirer, 2012). This new program is intended to meet the 12-year basic education global standards in order to develop their country further. Expanding the curriculum and the number of years spent in school will better educate citizens and present the Philippines as a more competitive nation (Philippine Daily Inquirer, 2012). The expansion of the educational system due to the new K to 12 program can be seen in Figure 6 on the following page.

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Figure 6. Comparison of 2002 education structure in the Philippines to the K to 12 program structure. Adapted from “Country Background Report Philippines”, by Department of Education, 2014, pp. 5.

From a DRR standpoint, the K-12 program has a great deal of potential. Under the new program, senior high school involves three different tracks that students are able to choose from, which are stated as thus: business, accountancy, management (BAM); humanities, education, social sciences (SESS); and science, technology, engineering, mathematics (STEM). The core curriculum in senior high school consists of seven subjects: languages, literature, philosophy, social sciences, mathematics, communication, and natural sciences (Official Gazette, n.d.). Under this structure, disaster readiness and risk reduction are taught for 80 hours per semester in grades 11/12, and the program is still being implemented in stages. The first cohort to have officially participated will not graduate until March of 2018. The data of the first senior high school classes (i.e., grade 11 in 2016-2017 and grade 12 in 2017-2018), will not be available until the grades are completed; furthermore, the analysis and results of the effectiveness or ineffectiveness of this program and its new curricula will not be ready for several years.

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This progressive change, while intending to benefit students and positively affect the future of the country, has been met with some resistance. Though many see the merit in the K-12 programs and are ultimately in agreement with results that the Department of Education is trying to accomplish, a petition has been brought to the Supreme Court to suspend the K-12 law. The group, Suspend K12 Coalition, of teachers and non-teaching staff claim that the K-12 program does not consider the labor rights of education staff, as thousands will be displaced when the program is fully implemented. The coalition believes the government is not ready for the program and is asking that the program be suspended until issues such as displaced labor are properly addressed. The Assistant Secretary of Development and Planning, Jesus Mateo, claimed that the government has plans for aiding those displaced by the program through funding that will be earmarked for a transition fund and other assistance programs (CNN Philippines, 2015). As a result, the future of the K-12 program is still uncertain. The Supreme Court may suspend the program before the first cohort graduates, or the program may be found to be ineffective several years from now.

The educational background for the United States, Oregon, Texas, and the Philippines is important in order to understand why one country has a national standardized curriculum and one country's curriculum is the responsibility of each individual state. The background also highlights the opposing opinions on the topic of a national curriculum among the states in this study. The inclusion of DRR education in school curriculum is affected by these decisions and those responsible for creating and implementing curriculum. Those countries and/or states that do include DRR education in their curricula need a way to determine if their initiatives are effective. The following section outlines UNICEF and UNESCO's efforts to create a tool used for the analysis of DRR practices.

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UNICEF/UNESCO DRR in School Curricula

The UNISDR was put in charge of overseeing the implementation the Hyogo Framework for Action (HFA). Their responsibilities include hosting forums and conferences, as well as running campaigns to push for action that leads to the fulfillment of the priorities set by the HFA. This includes Priority 3, which calls for DRR education material in school curricula. The 2009-2011 Compilation of National Progress Reports on the implementation of the Hyogo Framework for Action describing nations' advancements toward implementing education for disaster risk reduction showed that while many nations had good intentions, there was still a lot to learn about successfully integrating DRR curriculum (UNISDR, 2011). As many countries did not know exactly what other countries were doing, what was working, or what was not, UNICEF and UNESCO worked together to provide more effective communication and transparency (UNICEF, 2012).

In order to strengthen DRR initiatives, UNICEF and UNESCO collaborated on a study to compare how different countries have implemented DRR education into their curriculum. The objective was to find instances of significance within the nation to note any good practices, determine gaps or problems, and assess learning outcomes. Results from this study provided information that allowed governments to rethink or create new policies, practices, and implementation strategies based on the progress of others. Thirty countries from around the world were chosen as samples including the Philippines. In addition to analyzing DRR initiatives from a wide range of countries, UNICEF and UNESCO's research examined a diverse selection of teaching approaches including a textbook-driven approach, a pilot project approach, a symbiosis approach, a centrally developed special subject approach, a centralized competency-based approach, and the 'special event' approach.

At the end of the study, data findings concluded that there is currently no universal approach to disaster risk reduction that yields a consistent degree of effectiveness in terms of educating children

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(UNICEF, 2012). UNICEF and UNESCO created a checklist of what they considered to be ideal characteristics of an effective DRR curriculum. This checklist is divided into sections including questions about the pedagogy, student assessments, and teacher training (UNICEF, 2012). The following research focuses on the 13 questions in the DRR Curriculum section of the checklist as seen in figure 7 below.

DRR Curriculum Checklist	The Philippines K to 12	Oregon	Texas
Are students receiving cumulative exposure to disaster risk reduction through the primary and secondary grade levels?	Yes- K, 3, 4, 5, 6, 8, 9, 10, (11/12)	Yes- K, 3, 4, 7, HS (9-12)	Yes- 2, 3, 4, 6, 8, HS (9-12)
Are students within each grade level receiving reinforced exposure to disaster risk reduction across the curriculum?	No (science)	No (science, math, ELA, social studies)	No (science and social studies)
Does the disaster risk reduction curriculum consider multiple hazards?	Yes	Yes	Yes
Is there space within the curriculum for students to consider and address local and community hazards and disaster risk reduction practices?	Yes	Yes	Yes
Does the curriculum explain the causes and effects of hazards?	Yes	Yes	Yes
Does the curriculum explain that disaster risk multiplies according to the level of hazard and degree of vulnerability but that it can be reduced according to societal and individual capacity to cope?	No	No	No
Does the curriculum concretely address disaster prevention, mitigation, preparedness and resilience building?	Yes	No	No
Does the curriculum establish synergies with co-curricular or extra-curricular disaster risk reduction initiatives?	No	No	No
Does the curriculum treat both rapid onset and slow onset disasters?	Yes	Yes	Yes
Does the curriculum include climate change education?	Yes	Yes	Yes
Does the curriculum explore gender aspects of disaster risk reduction?	No	No	No
Does the curriculum consider disaster risk reduction education within a framework of education for sustainable development?	No	No	No
Does it also establish synergies with emergency education, environmental education, child and human rights education, child-friendly education and life skills education?	No	No	No

Figure 7. DRR curriculum checklist and responses. Adapted from “Disaster Risk Reduction in School Curricula: Case Studies from Thirty Countries”, by UNICEF and UNESCO, 2012, pp. 194. Copyright 2012 by UNESCO and UNICEF.

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In order to ascertain the effectiveness of curriculum in the Philippines, Oregon, and Texas, this DRR Curriculum Checklist was used as an analytic framework. The following sections summarize the application of this framework and the findings by question with the intention of identifying which elements of best practice are present and where there are potential gaps that may be hindering the effectiveness of DRR education. The format of each participant's curriculum is described, followed by a question-by-question analysis based upon the UNICEF/UNESCO checklist. This chapter concludes with an overall analysis of Oregon's, Texas', and the Philippines' curricula in regards to DRR education.

2014 Oregon Science Standards (NGSS) Curriculum

To assess the elements of DRR education within Oregon's curriculum, the researcher analyzed the New Generation Science Standards used by the state. The NGSS curriculum matrix is reader-friendly, color-coded, and clearly divided into specific sections of purpose. The matrix distinctly shows the standards of knowledge, which all students should be held accountable for by the end of each grade level. The foundation boxes are there to clarify and assist in meeting the performance expectations listed above them. The foundation boxes include science and engineering practices, disciplinary core ideas, and crosscutting concepts. Located beneath the foundation boxes are the connection boxes, which describe how the performance standards connect to the ideas on the same subject, with science in other grade levels, and with the Common Core State Standards for English language arts and mathematics. An example of the NGSS curriculum used by the state of Oregon can be found on the following page in Figure 8.

3-ESS2 Earth's Systems

3-ESS2 Earth's Systems		
Students who demonstrate understanding can:		
3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]		
3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.		
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> .		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. <ul style="list-style-type: none"> Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. <ul style="list-style-type: none"> Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2) 	ESS2.D: Weather and Climate <ul style="list-style-type: none"> Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1) Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2) 	Patterns <ul style="list-style-type: none"> Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2)
<i>Connections to other DCIs in third grade: N/A</i>		
<i>Articulation of DCIs across grade-levels: K.ESS2.D (3-ESS2-1); 4.ESS2.A (3-ESS2-1); 5.ESS2.A (3-ESS2-1); MS.ESS2.C (3-ESS2-1),(3-ESS2-2); MS.ESS2.D (3-ESS2-1),(3-ESS2-2)</i>		
<i>Common Core State Standards Connections:</i>		
<i>ELA/Literacy –</i>		
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2)		
RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)		
W.3.9 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-ESS2-2)		
<i>Mathematics –</i>		
MP.2 Reason abstractly and quantitatively. (3-ESS2-1),(3-ESS2-2)		
MP.4 Model with mathematics. (3-ESS2-1),(3-ESS2-2)		
MP.5 Use appropriate tools strategically. (3-ESS2-1)		
3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)		
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1)		

Figure 8. Oregon curriculum matrix for grade 3. Adapted from “DCI Arrangements of the Next Generation Science Standards”, by Next Generation Science Standards, 2013, p. 28. Copyright 2013 by Achieve, Inc.

The following analysis of DRR education elements was obtained utilizing the curriculum guides for kindergarten (Oregon Department of Education, 2014e), 3rd grade (Oregon Department of Education, 2014a), 4th grade (Oregon Department of Education, 2014b), middle school earth and space sciences (Oregon Department of Education, 2014d), and high school earth and space sciences (Oregon Department of Education, 2014c). For each question, the UNICEF/UNESCO checklist will be utilized to analyze the content of Oregon’s curriculum. Based upon the findings, the researcher will conclude whether or not Oregon’s curriculum possesses all of the elements that constitute best practices.

Are students receiving cumulative exposure to DRR through the primary and secondary grade levels? Under the NGSS curriculum in the state of Oregon, students are currently receiving DRR

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exposure in primary and secondary grade levels. While DRR is not touched upon at every level, it is however prevalent in multiple grades.

- In kindergarten, students learn how to prepare for and respond to severe weather conditions.
- Third graders learn about the actions and practices they can take in order to reduce the impacts of a natural hazard.
- In fourth grade students continue to learn about the practices that could reduce the negative effects of tsunamis, earthquakes, volcanic eruptions, and floods on human beings.
- Seventh graders are taught the region-specific history of natural hazards with the purpose of gaining a better understanding of the geologic forces that may be related. Analyzing and interpreting a region's history could assist in forecasting the probability of future events.
- High school students study the history of natural events their effect on population and migratory patterns of humans.

Are students within each grade level receiving reinforced exposure to DRR across the curriculum? Based upon the content of the NGSS curriculum, students are not exposed to DRR education across the curriculum at every grade level. However, the grade levels that do teach about natural hazards and DRR do include skills and aspects of other subjects. The NGSS curriculum has clearly displayed how each performance expectation is connected to standards in other subject areas at the bottom of each topic. These standards include but are not limited to: counting and cardinality (CC), expressions and equations (EE), operations and algebraic thinking (OA), quantities (Q), reading informational text (RI), reading in science and technical subjects (RST), speaking and listening (SL), writing (W), writing in history/social studies, science, and technical subjects (WHST; Next Generation Science Standards, 2013).

Standards:

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- Kindergarten DRR education touches English language arts through reading informational text (RI) and speaking and listening (SL). Mathematics is brought in through mathematics models (MP) and counting and cardinality (CC).
- Third grade also uses mathematics models as well as abstract and quantitative reasoning. Writing a point of view with supporting arguments and reasons and conducting research projects based on reducing the impacts of natural hazards combines DRR education and English language arts standards (W).
- Fourth graders strengthen their mathematics skills when using verbal statements about hazardous impacts on humans as multiplication equations. Students must apply an understanding of multiplicative comparisons when discussing solutions to reduce impacts. The performance expectation for the fourth grade also includes the reading skills of making inferences from text and using multiple sources to knowledgeably write or speak about topics such as natural hazards (RI, OA).
- In the seventh grade, one of the students' performance expectations is to "analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects" (Oregon Department of Education, 2014d, p.7). This performance expectation combines skills that cover several subjects. Students learn about referencing sources that allow them to create a visual representation of written quantitative or technical data (RST). Math skills are put into effect by using variables to create equations that solve real-world problems (EE).
- High school students in Oregon further their knowledge of DRR while strengthening their abilities in reading, writing, and mathematics. Students practice writing historical narratives, scientific procedures, or technical processes through an explanatory style (Q).

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Does the DRR curriculum consider multiple hazards? The data shows that multiple hazards are mentioned within the NGSS curriculum used in the state of Oregon. Severe weather such as hurricanes, tornadoes, floods, and droughts is discussed in kindergarten, third grade, seventh grade, and also in high school. Earthquakes, tsunamis, and volcanic eruptions are taught in fourth grade, seventh grade, and high school, while forest fires are present in the seventh-grade curriculum. While these hazards appear in the curriculum, they are listed as examples and not part of the performance expectation. This distinction allows teachers and/or students to choose their own types of hazards for their lessons or projects.

Is there space within the curriculum for students to consider and address local and community hazards and DRR practices? In analyzing the data, it appears that there is room for local and community hazards knowledge within the curriculum. According to the clarification statement for kindergarten performance expectations, the focus should be on local issues and events. To accomplish this expectation requires discussing severe weather risks in their communities in order to learn how to prepare themselves for and respond to potential events. Fourth-grade performance expectations remain generic with a statement about “natural Earth processes” (Oregon Department of Education, 2014b, p. 5). However, stipulations set up in the clarification statement that follows limit the lessons to earthquakes, floods, tsunamis, and volcanic eruptions. Seventh grade and high school performance expectations are also written in a general form that is open to interpretation in terms of which hazards to study. This type of language in the curriculum allows teachers to tailor what they teach, opening up the curriculum for local and community-relevant issues and events.

Does the curriculum explain the causes and effects of hazards? The content of the NGSS curriculum provides evidence that causes and effects related to natural hazards are included. Studying natural hazards to learn about the causes and observe the effects allows students to examine these

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relationships in order to determine changes. High school students learn how to look at evidence in order to determine whether the relationship of what occurs before and after natural hazards is causal or a correlation.

Does the curriculum explain that disaster risk multiplies according to the level of hazard and degree of vulnerability but that it can be reduced according to societal and individual capacity to cope? There is no indication within the curriculum that the varying degrees of potential risk or vulnerability are discussed. There is also no mention in the performance expectations or disciplinary core ideas about the capacity to cope. While measures are considered to prepare for and respond to hazardous events, there is no connection to the multiplication of risk. These measures do assist in coping with hazards, but that relationship is not clearly defined in the curriculum. The ambiguous language used in the performance expectations of the curriculum leave room for the relationship between vulnerability and the capacity to cope to be discussed, though this is not a standard requirement.

Does the curriculum concretely address disaster prevention, mitigation, preparedness, and resilience building? Considering the elements presented in the curriculum, it appears prevention, mitigation, preparedness, and resilience are not concretely addressed in the NGSS curriculum. The terms *prepare* and *mitigate* are specifically used as performance expectations in the kindergarten and seventh-grade curricula. The other grade levels focus on these concepts; however, it is not clearly defined based on the terms used. Kindergarteners are expected to be able to prepare for severe weather events. Though the term mitigation is not used, the idea is implied in third and fourth grade. Third graders are expected to reduce the effects or mitigate the hazards caused by weather phenomena. Fourth graders should participate in lessons that will teach them how to mitigate or reduce the effects of the Earth's natural processes that lead to hazardous events. In the seventh grade, students analyze hazards and interpret data to be more predictive of future disastrous events using technology. This

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ability will allow them to assist in mitigation measures through the advancement of technology. While none of the grade levels definitively discusses resilience building, “designing an earthquake-resistant building” is listed as a clarifying example solution for how to reduce the effects to humans of Earth’s natural processes under the fourth-grade performance expectations (Oregon Department of Education, 2014b, p. 5). It is ultimately up to the teachers or students upon which examples and solutions to focus. Due to this fact, it cannot be stated that disaster prevention, mitigation, preparedness, and resilience building are concretely addressed; accordingly, some students may study resilience building while others learn more about mitigation or preparedness.

Does the curriculum establish synergies with co-curricular or extra-curricular DRR initiatives? In analyzing the curriculum, there is no data to indicate that co-curricular or extra-curricular initiatives are being undertaken with the purpose of obtaining DRR knowledge or skills.

Does the curriculum treat both rapid onset and slow onset disasters? The elements of the curriculum showed that both rapid onset and slow onset disasters are present. While the NGSS does not overtly discuss types of disasters in the expectations of performance sections, many examples are provided in the clarifying statements. Rapid onset disasters are discussed in kindergarten, third grade, fourth grade, seventh grade, and high school. The only slow onset disaster mentioned is drought, which can be found in the seventh grade and high school clarification statements.

Does the curriculum include climate change education? Climate change is not part of the primary curriculum, but it is included in the secondary curriculum. High school students are expected to “construct an explanation based on evidence for how the availability of natural resources, the occurrence of natural hazards, and changes in climate have influenced human activity (Oregon Department of Education, 2014c, p. 11).” Under the clarification statement, climate change is further described by providing examples of its effects on humans and human activity such as the influence of

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mass migrations. Another high school expectation is to “analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems (Oregon Department of Education, 2014c, p. 10).” The assessment of this expectation is limited to one example and its effects even though multiple examples and effects are listed.

Does the curriculum explore gender aspects of disaster risk reduction? Based upon analysis of the data, there is no indication of gender being a topic of discussion in the curriculum within a DRR education framework.

Does the curriculum consider DRR education within a framework of education for sustainable development? Sustainable development is not stated within DRR education in any of the grade levels’ performance expectations or disciplinary core ideas. Based upon these findings, the NGSS curriculum does not fulfill the aforementioned element of the best practices checklist. While it is not present as a standard of the curriculum, it is possible for teachers to bring sustainable development into their lessons through the lenient opportunities for examples of the teacher’s choosing.

Does it also establish synergies with emergency education, environmental education, child and human rights education, child-friendly education and life skills education? Analysis indicates that the NGSS curriculum does not touch on every type of education listed above. The curriculum does not concretely address environmental education within the DRR framework; however, it is present when lessons are taught on the physical nature of hazards. Learning about the effects of hazards on the natural world, including landscapes, is an example of environmental education. This is evident in the high school curriculum when studying the types of climate change and their effects on the environment such as changes in sea level or glacial ice volumes. Emergency education is included in kindergarten curriculum through the study of how to prepare for and respond to severe weather events. This

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knowledge could be deemed life skills education because the desired effect is to save lives and reduce the impacts of hazardous events that could affect the daily lives of humans and their community. There is no evidence that child and human rights education along with DRR or child-friendly education is included. However, it could be argued that the inclusion of DRR in a child's education, by definition, should make it child-friendly, there is no guarantee. The curriculum does not specify how a teacher should teach the information required by the standards and expectations of each grade level. Materials and resources are suggested to teachers that have been deemed appropriate by the state. The only way to determine if child-friendly educational materials are being used is to assess the students' knowledge after their lessons. Since the NGSS curriculum is new to the state of Oregon, appropriate assessments need to be made based on this changing curriculum. The curriculum is still being implemented, and there is not enough information nor has enough time passed to gain an accurate assessment of the new curriculum.

Texas Essential Knowledge and Skills (TEKS) Curriculum

To assess the elements of DRR education within Texas' curriculum, the researcher analyzed the TEKS curriculum used by the state. The TEKS curriculum is not available in matrix form. Instead, it is presented in outline form. It is separated by subject course and consists of general requirements, an introduction to the subject, and knowledge and skills broken down by sub-topic. The following analysis was obtained through curriculum guides for elementary (grades K-5) science (Texas Education Agency, 2015a), middle school (grades 6-8) science (Texas Education Agency, 2015c), high school (grades 9-12) science (Texas Education Agency, 2015b), elementary social studies (Texas Education Agency, 2015d), middle school social studies (Texas Education Agency, 2015f), and high school social studies (Texas Education Agency, 2015e). This researcher will utilize the UNICEF/UNESCO checklist to

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analyze the TEKS curriculum question by question to conclude whether or not the Texas curriculum possesses all of the elements that constitute optimal DRR education.

Are students receiving cumulative exposure to DRR through the primary and secondary grade levels? The contents of the TEKS curriculum provide students with DRR education in primary and secondary grades, though not at each grade level:

- Second graders begin to connect the weather outside with appropriate preparations for their clothing, activity, and transportation efforts. They also learn about the ways that hazards affect the settlement patterns of humans.
- Third graders discuss the hazards that change the surface of the Earth. They also investigate the physical environment and the hazards that create environmental changes for organisms such as humans.
- Fourth graders learn about slow processes such as weathering and erosion, which can change the Earth's surface and lead to natural hazards.
- In the sixth grade, students identify geological hazards tied to plate tectonics. At the end of the year, students should be able to expound upon the effects that earthquakes and erosion have on the physical environment and how humans interact with the environment using technology for practices such as flood control dams.
- Seventh graders describe the ways that natural hazards affect the surrounding environment and ecosystems. Through the examination of past events and the effects of erosion, students learn how natural hazards can influence the social, economic, and political development of Texas.
- In eighth grade, students strengthen their knowledge of plate tectonics, learn about the creation of hurricanes, and study weather maps to determine the influence of global atmospheric patterns over local weather.

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- High school students learn more about natural hazards in several different science and social studies classes. Some of the knowledge they gain includes learning how to: identify relationships between aquatic systems and climate or weather; determining relationships between ocean currents, climate, and geological features; discussing the causes and effects of several different types of hazards; examining the impact of humans on the Earth's systems and the impact of natural hazards on people and communities; and utilizing this knowledge to become educated, decision-making stewards of the community.

Are students within each grade level receiving reinforced exposure to DRR across the curriculum? Based upon analysis of the TEKS curriculum, it appears that DRR instruction is not mentioned in every grade level. However, within the grade levels that do include forms of DRR, it is discussed throughout multiple courses of the TEKS curriculum. Much of the knowledge students gain about natural hazards and DRR are in basic science classes. However, in high school, students learn about these topics in more specific science classes such as aquatic science, earth and space science, and environmental systems. However, science is not the only subject that teaches about the causes and impacts of hazards and disasters. Primary students focus on DRR education in their social studies class. Elements of DRR are primarily found under the sub-topic of geography. Geography is also where second, third, sixth, and seventh graders using the TEKS curriculum find aspects of disaster education. The high school social studies classes of United States history and world geography also include hazards education in the curriculum.

Does the DRR curriculum consider multiple hazards? The TEKS curriculum indicates the inclusion of multitude of hazards through various grade levels.

- Second graders learn about daily weather.
- Third graders discuss floods, droughts, landslides, volcanic eruptions, and earthquakes.

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- Fourth graders take a closer look at erosion.
- In the sixth grade, students touch on flooding, erosion, volcanoes, and earthquakes.
- Seventh-grade students focus on hurricanes, tornadoes, floods, and erosion.
- Eighth graders investigate plate tectonics, hurricanes, local weather, and climate change.
- In high school, students have the opportunity to gain knowledge about climate change, hurricanes, earthquakes, volcanic eruptions, fires, plate tectonics, floods, tsunamis, and erosion.

Is there space within the curriculum for students to consider and address local and community hazards and DRR practices? Considering the contents present in the TEKS curriculum, there is room for the discussion of local and community hazards. Students in the second and eighth grade take a closer look at the local weather to predict and prepare for various possibilities. Seventh graders analyze the Galveston hurricane of 1900 while United States history students in high school analyze Hurricane Katrina and the subsequent levee failures. These two events may not have directly affected every person in the state of Texas, but it did indirectly affect Texans everywhere through the economy and mass migrations of people relocating either temporarily or permanently. The other grade levels that take part in DRR have the chance to tailor some of their examples to local situations due to the ambiguous language used for the knowledge and skills required.

Does the curriculum explain the causes and effects of hazards? The TEKS curriculum does include an explanation of the causes and effects of many natural hazards. By the time a student graduates from high school, he or she should know the causes of hurricanes, local weather, earthquakes, volcanoes, climate change, and other geological hazards. They should also know the effects of volcanoes, earthquakes, hurricanes, fires, and erosion. This knowledge extends to the effects hazards have on the settlement patterns of people, daily activities, the physical landscape of the Earth's surface, and the social, economic, and political development of a community.

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Does the curriculum explain that disaster risk multiplies according to the level of hazard and degree of vulnerability but that it can be reduced according to societal and individual capacity to cope? As can be seen in the contents of the curriculum, the capacity of an individual or society to cope is not mentioned. Furthermore, there is no indication of lessons examining the relationship between the level of hazard and a community or individual degree of vulnerability.

Does the curriculum concretely address disaster prevention, mitigation, preparedness, and resilience building? The curriculum indicates that not all of the aforementioned aspects of DRR are concretely discussed. The words prevention, mitigation, and resilience building are not used within the DRR framework of the TEKS curriculum. Preparedness is addressed through the study of weather and its affect daily activities. Mitigation practices are addressed when learning about making decisions for a community or as an individual to find ways to reduce the impacts of natural hazards such as building dams to control flooding.

Does the curriculum establish synergies with co-curricular or extra-curricular DRR initiatives? The TEKS curriculum provides no evidence that the above element of the best practices checklist is being satisfied. Co-curricular and extra-curricular DRR initiatives are not included in the context of the curriculum.

Does the curriculum treat both rapid onset and slow onset disasters? The TEKS curriculum indicates that inclusion of knowledge about both rapid onset and slow onset disasters is present. While the majority of the focus is on rapid onset disasters including earthquakes, hurricanes, volcanic eruptions, tornadoes, fires, and tsunamis, several grades mention slow onset hazards such as climate change and droughts.

Does the curriculum include climate change education? Under the TEKS curriculum, students learn about climate change in the eighth grade and high school. Eighth-graders learn about global

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patterns of atmospheric movement and how interactions in the ocean, weather, and solar systems can cause changes in climate. In high school, students focus more on how aquatic systems are related to climate change. They also examine how plate tectonics can cause climate change and discuss how the activities of people influence climate change.

Does the curriculum explore gender aspects of disaster risk reduction? Based on analysis of the content, the use of a gender perspective or the discussion of gender disparities as a cross-cutting issue is not part of the TEKS curriculum at any grade level.

Does the curriculum consider DRR education within a framework of education for sustainable development? The TEKS curriculum includes elements of sustainability, for example, renewable resources, but not in reference to disaster risk reduction. Based on this finding, Texas does not meet this requirement of the UNICEF/UNESCO checklist.

Does it also establish synergies with emergency education, environmental education, child and human rights education, child-friendly education, and life skills education? The curriculum establishes synergies with some of the above-mentioned types of education; however, it does not address all of them. Emergency education, and child and human rights education are not present in the TEKS curriculum at any grade level. The assumption that goes along with the education of students from kindergarten through twelfth grade is that the lessons are child-friendly. Whether lessons are child-friendly cannot be proven through the curriculum alone. The resource materials used to teach the lessons as well as students' assessments would determine if the DRR education they received was effective, and therefore child-friendly. Life skills are provided in lessons that teach students how to dress appropriately for the weather and how to make decisions to protect individuals and communities against natural hazards. Curriculum knowledge addressing disasters and natural hazards also touches upon environmental education. Students learn how natural hazards cause changes in the physical

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landscape of the environment, and how humans can affect the physical environment through settlement and crop production.

The Philippines K-12 Curriculum

To assess the elements of DRR education within the Philippines’s curriculum, the researcher analyzed the K to 12 Basic Education Curriculum used by the state. The K-12 Basic Education Curriculum is presented in matrices for each grade level. These matrices define the content, content standards, performance standards, learning competencies, codes, and learning materials for each topic under each subject at every grade level. An example can be found in Figure 9 below.

K to 12 BASIC EDUCATION CURRICULUM GRADE 5					
CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCY	CODE	LEARNING MATERIALS
Grade 5 – Matter FIRST QUARTER/FIRST GRADING PERIOD					
1. Properties 1.1 Useful and harmful materials	<i>The Learners demonstrate understanding of...</i> properties of materials to determine whether they are useful or harmful	<i>The Learner...</i> uses local, recyclable solid and/or liquid materials in making useful products	<i>The Learner...</i> 1. use the properties of materials whether they are useful or harmful;	SSMT-Ia-b-1	
2. Changes that Materials Undergo	materials undergo changes due to oxygen and heat		2. investigate changes that happen in materials under the following conditions: 2.1 presence or lack of oxygen; and 2.2 application of heat;	SSMT-Ic-d-2	
			3. recognize the importance of recycle, reduce, reuse, recover and repair in waste management; and	SSMT-Ie-g-3	
			4. design a product out of local, recyclable solid and/or liquid materials in making useful products.	SSMT-Ih-i-4	
Grade 5 – Living Things and Their Environment SECOND QUARTER/SECOND GRADING PERIOD					
1. Parts and Functions 1.1 Humans 1.2 The reproductive	<i>The Learners demonstrate understanding of...</i> how the parts of the human reproductive system work	<i>The Learners should be able to...</i> Practice proper hygiene to care of the reproductive organs	<i>The Learners should be able to...</i> 1. describe the parts of the reproductive system and their functions;	SSLT-IIa-1	<ul style="list-style-type: none"> • BEAM – Grade 5 – Unit 1 – Reproductive System (Science 5 – DLP 1) • BEAM – Grade 5 – Unit 1 - Menstrual
			2. describe the changes that occur during puberty;	SSLT-IIb-2	

Figure 9. K to 12 program curriculum matrix for grade 5. Adapted from “K to 12 Curriculum Guide SCIENCE”, by Republic of the Philippines Department of Education, 2013, p. 30.

The following information was ascertained through the analysis of the curriculum guides for kindergarten (Republic of the Philippines Department of Education, 2015d), grades 1-10 (Republic of the Philippines Department of Education, 2015c), grades 11/12 earth and life science (Republic of the

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Philippines Department of Education, 2015b), and the grades 11/12 disaster readiness and risk reduction STEM course (Republic of the Philippines Department of Education, 2015a). For each question, the UNICEF/UNESCO checklist will be utilized to analyze the content of the Philippines' curriculum. Based upon the results, the researcher will determine whether the Philippines' curriculum possesses all of the elements that constitute optimal DRR education.

Are students receiving cumulative exposure to DRR through the primary and secondary grade levels? Under the new K-12 program, students in the Philippines from primary grades through secondary grades will be receiving DRR education. This appears in the curriculum for kindergarten, grades 3, 4, 5, 6, 8 9, 10, and grades 11/12 for the STEM track. Based upon these findings, students in the Philippines are receiving cumulative exposure to DRR.

Are students within each grade level receiving reinforced exposure to DRR across the curriculum? While prevalent in most grades, students do not acquire DRR education at every grade level. It does not span across subjects but remains under the subject area of science. The lack of DRR education in more than one subject area and in more than one grade indicates that students are not receiving exposure to DRR across the curriculum.

Does the DRR curriculum consider multiple hazards? Based upon analysis of the curriculum, it appears that multiple natural hazards are included in the K to 12 program:

- An introduction to weather-related hazards is presented in kindergarten by learning more about the cause and effect of everyday, well-known weather events. This includes lessons on how to remain safe and how to dress appropriately based on weather conditions.
- In grade three, knowledge is further expanded by looking at the effects of weather on a local community.

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- Grade 4 reiterates the importance of planning and preparing for safety during all types of weather.
- A more targeted approach is used in grade five by focusing on typhoons. Students should be able to prepare emergency kits for themselves, recognize the weather changes before, during, and after typhoons, and understand how typhoons affect communities.
- Grade six centers around earthquakes and volcanic eruptions. Students learn how these hazards affect the surface of the Earth and the appropriate measures to take before, during, and after their occurrence.
- Grade 8 expands a student's knowledge by adding to his or her foundation of typhoons and earthquakes.
- Students learn about the causes of earthquakes, tsunamis, and typhoons in detail. For example, this involves learning about advantageous places to construct buildings based on active fault line locations, making emergency plans and kits for school and home, actively attempting to decrease potential risks of typhoons, and establishing what to do before, during, and after a typhoon event all form a part of the grade eight curriculum.
- Students in grade nine delve further into the effect of volcanic eruptions.
- The grade 10 curriculum focuses on preparedness efforts for volcanic eruptions, earthquakes, and tsunamis by learning how to assist the government in their endeavors to decrease negative impacts.
- In senior high school (i.e., grade 11 and 12), the curriculum covers the hazards caused by coastal processes, geological processes, and hydro meteorological phenomena. Students explore hazards caused by other hazards, distinguish areas susceptible to hazards, provide potential coping mechanisms, causes of landslides, effects of coastal processes, and identify potential

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mitigation and prevention techniques for coastal processes.

Those students taking the STEM track take a special science course geared specifically toward disaster risk reduction. To learn about disasters, disaster risks, the nature of disasters, and the effects of disasters, the curriculum takes a more in-depth look at the various types of hazards including their nature, their causes, their effects, how to prepare for them, appropriate measures to take before, during, and after hazardous events, mitigation techniques, response measures, the concept of disaster risk reduction, family emergency preparedness plans, and how to prepare and plan for disasters at the community level.

Is there space within the curriculum for students to consider and address local and community hazards and DRR practices? The curriculum indicates that local and community hazards are included in the curriculum as discussions and used as examples in several grade levels. Throughout the grades, the focus is on the natural hazards of earthquakes, volcanoes, tsunamis, and typhoons, which all affect the Philippines.

- Grade three mentions learning the different ways that community activities and events could be affected by various kinds of weather.
- Grade 5 identifies a learning competency that discusses how the community could be affected by typhoons.
- Grade eight standards involve studying active fault lines that affect the community in order to determine the best place to construct buildings.

Does the curriculum explain the causes and effects of hazards? The causes and effects of several hazards are presented in the curriculum under content, standards, or learning competencies. The curriculum specifically focuses on the most common hazards that the Philippines faces.

- The causes of typhoons are listed under grade eight while the effects are listed under grade five.
- The causes of tsunamis are discussed in grade eight.

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- In grade 10, the causes of earthquakes are taught.
- Students learn about the effects of earthquakes in grade six along with volcanic eruptions, which are also taught in grade nine.
- In grades 11/12, the causes and effects of various hazards are highlighted.
- The STEM track (grade 11/12), focuses on the effects of disasters, the effects of earthquakes, the effects of volcanoes, the causes of geological hazards, and the causes of fire hazards.

Does the curriculum explain that disaster risk multiples according to the level of hazard and degree of vulnerability but that it can be reduced according to societal and individual capacity to cope? The curriculum does not overtly mention how the capacity to cope can affect the relationship between the level of a hazard and the degree of vulnerability. However, the curriculum does discuss the capacity to cope:

- Practical ways of coping with geological hazards. . . hydro meteorological hazards. . . coastal erosion, submersion, and saltwater intrusion” are listed under the learning competencies for grades 11/12 (Republic of the Philippines Department of Education, 2015b, p. 4). However, it is unclear if this refers to individuals or the community, or if this applied in a psychological or physical way.

Does the curriculum concretely address disaster prevention, mitigation, preparedness, and resilience building? The content of the curriculum provides evidence that each of the aforementioned aspects of DRR are present in one grade level or another, however, there is not a grade level that includes all four aspects. Preparedness is well covered for specific hazards, as well as for general emergency planning:

- In kindergarten, lessons focus on preparing for all types of weather through dressing appropriately and participating in safe exercises.

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- Grades 3 and 4 continue the discussion of safe practices and measures to take during different weather conditions.
- Grades 5, 6, 8, and 10 have a focus on emergency planning and preparedness kits.
- Grade 8 presents resilience-building techniques by planning building locations around active fault lines in the area. Ways to reduce the potential risks in the face of typhoons are also a standard in grade 8 curriculum.
- Grade 10 standards call for a discussion on how to assist the government in their mitigation and resilience-building practices for volcanic eruptions, earthquakes, and tsunamis.
- Grades 11/12 focus on preventing or mitigating the potential damages caused by coastal processes and landslides in the community.
- The STEM track in grades 11/12 teaches mitigating practices for geological hazards and community-based DRR efforts.

Does the curriculum establish synergies with co-curricular or extra-curricular DRR initiatives?

There is no indication within the context of the curriculum that co-curricular or extra-curricular DRR initiatives are included.

Does the curriculum treat both rapid onset and slow onset disasters? The K-12 program curriculum shows the inclusion of teachings or lessons on both rapid onset disasters and slow-onset disasters. Most hazards focused on throughout the grade levels are rapid onset including typhoons, earthquakes, tsunamis, and volcanic eruptions. Slow onset disasters can often be associated with climate change and its effects, which are both covered in grade 9. The effects of climate change and climatic phenomena are listed as part of the learning competencies for the year. However, climate change is written in very general terms. There is no mention of any specific types of slow onset

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disasters; to implement this, it would be up to local curriculum or individual teachers to determine how in depth they would teach slow onset disasters.

Does the curriculum include climate change education? As can be seen in the curriculum for grade nine, climate change is explored by students of the Philippines. As explained above, the effects of climate change and certain climatic phenomena are presented in the curriculum; however, it does not specify what type of phenomena. Thus, the curriculum is open to tailoring from the teachers.

Does the curriculum explore gender aspects of DRR? Analysis of the curriculum shows that it does not explore gender aspects of disaster risk reduction. There is no indication in the K-12 program curriculum that gender discussions occur when learning about disaster or disaster risk reduction. Using a gender lens to gain new perspectives on how disasters may affect men and women differently is not listed as a standard or a learning competency. A gender perspective is also excluded from the in-depth curriculum that STEM students receive in their DRR course.

Does the curriculum consider DRR education within a framework of education for sustainable development? DRR education was not considered within a framework of sustainable development. While prevention, mitigation, and preparedness are discussed in terms of individual families and buildings, long-term community sustainability is not.

Does it also establish synergies with emergency education, environmental education, child and human rights education, child-friendly education and life skills education? The K to 12 curriculum does not connect all of the above types of education, though it does combine environmental education and disaster risk reduction. Learning about the physical nature of hazards and touching on the effects that natural hazards can have on landscapes are examples of environmental education. Grade 6 specifically covers environmental changes to the surface of the Earth due to earthquakes and volcanic eruptions. The effects of climate change are part of the content standards of grade nine. The DRR course for

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STEM students gives particular attention to the environmental elements that are affected by hazards. Child and human rights education along with life skills are not present in any of the grade level curricula involving disaster risk reduction. However, it could be argued that learning how to prepare for and respond to a disaster by making emergency plans and creating an emergency preparedness kit are life skills, since the intended purpose is not only to alleviate the impacts to physical and social structures, but also to save lives. One part of the curriculum content for STEM students focuses on DRR and DRR management (DRRM). These parts comprise of taking a closer look at policies, regulations, and laws such as RA 10121. Under these standards, students learn about different services, programs, and projects affiliated with DRR and DRRM. While child-g geared education is not mentioned as a learning competency, school education is under the purview of RA 10121.

Analysis

This section of the study provides an overall analysis of the curricula from Oregon, Texas, and the Philippines based on the findings from every question of the UNICEF/UNESCO checklist. In each of the three study subjects, the curricula includes multiple hazards, opportunities to learn about local and community hazards, while the curricula also mentions both rapid onset and slow onset disasters, and climate change education. They also provide cumulative exposure to DRR in primary and secondary grade levels, though, it is not present in every grade level. Students in the Philippines receive exposure in the most grade levels while Oregon receives the least. However, the Philippines only presents DRR education in science courses while the Oregon curriculum shows how the DRR performance expectations and disciplinary core ideas incorporate other subjects and skills including science, English language arts, mathematics, and social studies. Texas measures in the middle of both categories with more grade levels involved than Oregon and more subjects involved than the Philippines.

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There were several questions in which all three study subjects failed to satisfy the checklist and they received “no” responses. None of the subjects presented co-curricular or extra-curricular DRR initiatives and the connection between disaster risk and a society’s or individual’s capacity to cope is not emphasized in any of the curricula. Gender aspects within a DRR framework are not explored by the Philippines, Oregon, or Texas. Although sustainable development was mentioned in the TEKS curriculum, it was not discussed in relation to DRR education. The Philippines and Oregon also did not reference sustainable development education within the context of DRR, and neither did any of the subjects explore child and human rights in terms of DRR education.

One way that the three participants differ is whether disaster prevention, mitigation, preparedness, and resilience building are concretely addressed. The Philippines is the only instance in which all of the aforementioned aspects of DRR are included somewhere in the curriculum. They are not all addressed in the same grade level, but rather they are spread out between grades. While prevention and resilience building are touched upon, the main points of focus are mitigation and preparedness. Mitigation and preparedness are also the primary focus in the Oregon and Texas curricula though resilience building is not present.

The “yes” responses show the ways that the Philippines, Oregon, and Texas are working towards including and implementing DRR into school curricula. The “no” responses identify where there are gaps in the curricula. The “no” responses highlight evidence that there are many areas in which DRR can still be implemented in each case. The questions that received “no” responses are where the focus needs to be when making changes to the curriculum. Those who influence and those who are responsible for creating and amending curricula need to concentrate on expanding the exposure of DRR in order to include more subject areas and reach every grade level. Introducing child and human rights and gender perspective to the conversation when discussing DRR education is

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another important gap in the curriculum that needs to be addressed in all three study subjects.

Chapter Five: Summary and Recommendations

Summary

Disasters have occurred throughout history, with millions of people facing the destructive effects of their aftermath; moreover, their intensity and frequency has only continued to increase in recent decades. When combined with a growing population, the rise of mega-cities, and a lack of effective preventative measures, the world nonetheless faces a greater disaster risk today than ever before. Disasters can wreak havoc on people's lives and affect their ability to support themselves. Tens of thousands of people are affected each year by disasters in one way or another. It has become harder to ignore that disasters are a concern for most individuals and communities. However, there are measures one can take to prevent, mitigate, prepare for, and build resiliency against potential disaster risks.

People need to be informed of these practices in order to protect themselves and their families; consequently, many organizations and actors are involved in providing resources and information to anyone who wants them. Knowledge is key. Education is especially important for more vulnerable populations such as children. The most efficient way to reach as many children as possible is within the education system. Teaching children how to prepare for and respond to a disaster can be extremely beneficial, as having an awareness can help to reduce some of the emotional and psychological risks. Through every day socialization, children can take what they learn in the classroom and bring it home to share with their family and friends. This type of networking can benefit the community by expanding the breadth of knowledge and awareness of DRR practices. It also increases the number of people in the community who have the ability to protect themselves and help in the period after a disaster strikes. More knowledgeable community members creates a smaller population of vulnerable people who may hinder the response and relief efforts of parents or a community. The goal is to foster a

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culture of preparedness that will become so ingrained in the next generation that reducing disaster risk is second nature. To accomplish this goal, DRR education must be implemented into school curricula around the world.

Through the development of the Hyogo Framework of Action (2005), member states of the United Nations have committed themselves to integrating DRR into schools. To implement this, UNICEF and UNESCO completed a case study on DRR education in 30 countries. The outcome of their study led to a checklist of the best aspects of effective DRR curriculum practices. Using the DRR Curriculum section of the checklist, this research study analyzed the curriculum of the Philippines' new K to 12 program, Oregon's NGSS curriculum, and Texas' TEKS curriculum. The results indicated that each curriculum guide included DRR education such as multiple hazards, climate change, causes and effects, and the opportunity for emphasis on local and community disaster risks. The study also highlighted areas where DRR was lacking such as inclusion at every grade level, gender perspectives, and how the capacity to cope is connected to disaster risk.

While disaster risk reduction education is present in the curriculum of the Philippines, Oregon, and Texas, more could be done to fully integrate it in order to ensure that every grade level receives the benefits of cumulative DRR lessons. However, inclusion in the curriculum does not necessarily guarantee an effective outcome. Assessing the students to make sure they meet the required performance expectations of that grade level is an indication of how well the students understood and retained the information from the teachers' lessons and the resource materials used; these assessments indicate how subjective a curriculum can be. In the Philippines, Oregon, and Texas, the teachers have a lot of control over how they teach the performance expectations. Teacher dependent flexibility can be a positive aspect of education. Teachers teach differently based on their strengths, their resources, their location, and what types of learners their students are. Having flexibility in the curriculum allows for

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creativity and innovation. However, there are also negative aspects in allowing teachers the freedom to teach a lesson the way that they choose. For example, teachers may focus too much time on a specific hazard and not enough time on different types of hazards. This could also cause disparities among students with different teachers or in different parts of the country who are receiving varying levels of DRR education. There is also the possibility that teachers may not follow the curriculum standards at all. While it is up to the school districts to ensure their teachers are following the curriculum, district representatives do not stand in the classroom every day to ensure that the instructions are followed.

Recommendations and Suggestions for Further Research

Based on the findings of this study, there are several recommendations and suggestions for further research. The study presented in this paper only provides insight into a small percentage of curricula around the world. More research could be done to duplicate this study in other countries or states. For example, a comparison could be made between other states in the United States of America or between other countries in different regions of the world. This research was an exploratory look into DRR and its inclusion in school curricula. Gaps in the curriculum were identified and areas where aspects of DRR education could be used were highlighted. Organizations and governments may use this research to create a new curriculum, or make changes to the current curricula to address this issue and provide the most comprehensive curricula possible. Another study could examine the students assessments based on the curricula of a specific school, district, or region. This would assist in giving a more in-depth look at how effective the teaching has been in that population area. Once effective relationships have been recognized, research could then be conducted on the specific educational materials and resources used in order to determine best practices.

The United Nations' initiatives such as the Hyogo Framework for Action have highlighted the call for incorporating disaster risk reduction in schools. Many countries around the world have begun

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programs and updated their curricula such as the ones in this study. While this is important, it is only one aspect of integrating DRR into education systems around the world, as DRR education needs to go further than including it in national, state, and local curricula.

In the end, curricula are merely guidelines for teachers and expectations for students. They are not the specific resource responsible for passing on knowledge and teaching DRR. There needs to be a global effort to assess and create effective learning materials and teaching resources, and there are currently many resources available for teaching children about natural hazards and disasters. Creating nationally or even globally approved educational materials on disaster risk reduction with the assistance of teachers, students, experts in curriculum, experts in developing teaching resources, and experts in the disaster field would be a positive way to ensure that teachers are provided with appropriate and effective options for classroom lessons. To create widely accepted lessons and materials would require marketing the resource to governments, education departments, school administrators, and teachers in order to keep them informed as to which resources are available, and how to properly implement them. Having the United Nations, a respected and neutral organization, endorse curriculum could assist in the promotion of the resource. Once the new learning material has been developed and brought to the attention of as many people in the education field as possible, teachers and administrators need to be appropriately trained to utilize the resource in the most effective way possible. A holistic approach will do more to create a fully integrated and effective way of providing DRR education than focusing solely on curricula and performance expectations.

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