Living with Geological Hazards for Fifth Graders

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INTRODUCTION

Geological forces are a major factor in the world around us. They determine where and how we live, work and play. They can determine why things are done in a certain manner, what can be done, what materials can be used, and how things are performed. It is hard to go downhill skiing or sledding if there are no hills or mountains around to slide or ski down. If they are to be performed where the land is flat, then accommodations have to be made. This can cause significant problems or benefits for the people who live where those accommodations are to be added. The creation of these can cause life-changes for the citizens around the proposed site. This can be observed in areas where strip mining has occurred. This process can cause flooding, landslides and major environmental changes to the area where it is practiced. The additions of shopping malls or housing developments also change the environment where they have been built. With this in mind, the knowledge of safe environmental practices is something that should be taught from an early age to children.

As they grow older and can put into practice the things they have learned, it is to be expected that they will remember safe practices and put them to use. The knowledge of how to safely manage the environment is paramount to having a safe world in which to live. Knowing about geological hazards and how to incorporate safety standards while living in the vicinity of them will help lower incidents of death, injury and destruction. Thus this knowledge not only saves lives (a paramount concern) but also can save millions if not billions of dollars to replace or rebuild in areas where a major disaster has occurred. The disruption of lives can be minimized or avoided altogether causing greater advantages to those who may have been involved in the disaster. The knowledge of how to safely manage the environment enables the students to make informed decisions about methods of environmental manipulation and how effective those methods may be as well as the consequences of such manipulation for others, or in later years. This is why I intend to address the subject in my classes using the curriculum developed here.

Living in an area underlain by active ground faults can cause enormous destruction, disability, and even death. The question is how to avoid or at least minimize these possibilities. The people who inadvertently or purposefully live in these areas need to learn to make accommodations and employ safety precautions in an effort to protect themselves, their family and/or property in as much as they are able. The same can be said for those living in areas prone to known hurricane, tornado, and flood plains or within the vicinity of dormant or active volcanoes. Although these geological events are taught in the basic science curricula, most only briefly cover, or do not cover at all, the reason why the student needs to know this information. I firmly believe that if you show the student the importance of information and how it will or does affect them directly, then they will be enormously interested in that information and endeavor to learn all that they can about that subject. I also believe that if you allow the students to become involved in the direction the learning is occurring, then they will take ownership of the knowledge and far exceed expectations of what they need to learn:

> For active, critical reading to occur, teachers must create an atmosphere that fosters inquiry. Students must be encouraged to question, to make predictions, and to organize ideas which support value judgments…When literature is approached from a problem solving perspective, students are asked to evaluate evidence, draw conclusions, make inferences, and develop a line of thinking… children are capable of solving problems at all ages and need to be encouraged to do so at every grade level…Teachers may want to experiment with a particular children's book and plan a lesson which places reasoning at the center of instruction. (Collins 2)

I strongly believe that children are prolific learners. Many times they learn despite the efforts of many to keep them uninformed of certain types of information. Therefore, it is important that the information that they need is presented in such a manner as to incite their curiosity and desire to know.

It is not an easy task to incorporate higher level thinking skills into the classroom, but it is a necessary one. For students to participate in the society in which they live, they must have experiences that prepare them for life. In order to become critical thinkers, it is essential that students learn to value their own thinking, to compare their thinking and their interpretations with others, and to revise or reject part of that process with it is appropriate:

> A classroom environment which is student-centered fosters student participation in the learning process. Learning that is both personal and collaborative encourages critical thinking. Students who are reading, writing, discussing, and interacting with a variety of learning materials in a variety of ways are or likely to become critical thinkers. (Collins 3)

Children delight in sharing information with each other and with willing adults. This is why I choose to use small group learning as much as is possible in a given situation. Using small groups allows the added perspective of diverse thinking, which allows synergistic learning to occur. The students not only learn what the others know but this knowledge sparks a higher level of thinking that would not have been possible without the others' input.

Living in the Gulf Coast Region, there are many instances that geological hazards occur, mostly in the form of hurricanes, tornadoes, and flooding. The stress this causes to the children is great because they do not have an understanding of what is happening or what can occur. They only know that something dangerous is coming. This can cause a great amount of stress to a young child, especially to one who lives in an already stressful situation of poverty. Many of these children live not only in low-income housing but also in dual language households, with parents who have a low level of education. This also limits the prospects of being able to provide for any catastrophic losses that may occur due to unexpected disasters.

Helping the children to understand what is happening and why it is happening can help alleviate some of the fear. Giving them coping strategies will also help the children to deal with the fear. The unknown is always more scary than the known. When they become aware of what may occur they can begin to make plans to help themselves. This knowledge and ability creates within the child a sense of self worth and self-esteem that may have been lacking due to circumstantial situations beyond their control. This enables them to exercise a form of control over their lives thus increasing their confidence in themselves. That in turn can spark a cycle of self-improvement that could eventually lead to financial, emotional, and social success in their future:

> Literature can revitalize the content areas. It's important to remember, however, that it's not enough to supplant or supplement the content area textbook with literature. We need to also make certain that students are actively involved in discussions and are engaged in

> relevant activities such as writing, interviewing, experimenting, observing, categorizing and other hand-son activities in the content areas. (Manning 3)

These children will also grow up to live or work in areas prone to all types of geological hazards. Having knowledge of how or why they occur, how to avoid them, and how to minimize their effects will be a determining factor in their ability to be successful later in life. By making more informed choices and better decisions about where to live, work, and/or play, the child, having grown up, will have the knowledge based on some things learned in this class. Knowing what to look for, or the signs of the probable occurrence of these hazards, will enable them to make better life choices, such as how to choose land for a house or where to locate or avoid building future business sites. A recent example of the importance of this type of knowledge is the report of a young elementary girl who saved several lives during the December 2004 Tsunami by knowing the signs and probable cause of the receding tide thus allowing many people to retreat to safety before the incoming waves reached shore.

With this type of basic knowledge, the students will not have to be geologists in order to make informed decisions. They will only need to have a good basic knowledge of the subject. "Some educators believe that learning is a process of searching for and making connections…which some refer to as intertextuality. Literature discussions are particularly suitable for learning by making connections" (Martinez and Lopez 8). They also need to know that these types of geological hazards can have a major impact upon their lives indirectly. In the February issue of the *Southeast Farm Press*, issue was taken with the fact that the supermarkets and grocery stores had taken advantage of the farmers and the customers in that while the farmers had made great strides in overcoming the deficit in fruit and vegetable production caused by recent hurricanes, the stores had not followed suit with decreasing prices in the stores. The marked decrease in the shortage caused a fall in the prices the farmers received. The failure to lower prices in the store in turn caused the consumers to purchase less, creating less of a demand for the farmers and growers. Because of this decrease in demand, many farmers had to allow the produce to rot in the field.

Other areas of their lives that could be affected would be insurance rates, electrical services, and home construction. According to the *Insurance Advocate* (February 2005 issue), in 2003 there were 21 major disaster events with a cost of $12.9 billion, but in 2004 there were 22 major disaster events with the price tag more than doubling to $27.3 billion. During the 2004 hurricane season, many of the electrical crews were already out repairing damage done by previous hurricanes when the next came along and undid what had already been fixed and created even more problems ("Emergency Response Awards" 8). Crews from as far north as Canada were called to Florida to help correct the problems. This action created shortages for the areas that sent the extra crews and rerouted monies to repairs that had been collected to make major renovations other places. Because of the occurrence of so many devastating disasters in densely populated areas, the construction of new homes and buildings have to undergo changes in the methods used for building and higher standards must be met for building codes. This increases the cost of production and the time needed to construct the buildings causing rising prices in building costs and materials because of the increased demand to replace what was destroyed.

These are just a few of the ways that people's lives can be affected by geological hazards. By beginning early to help my fifth graders to understand that the effect of a geological hazard goes beyond what is seen in the geological world, I hope to help them become more aware of the ramifications of the events that occur in the world around them. Unless the importances of these situations are revealed to them, most children will not see that these events could affect their lives.

GOALS

I intend to teach: 1) what the geological hazards are, 2) how they occur, 3) why (as much as possible) they occur, 4) where they occur, and 5) how you can know that they are getting ready to occur (again, if possible). Students need to know what to look for so they can be aware that these things are a possibility and how to deal with or work around them or how to know when this is impossible. They also need to know how these hazards have created and/or destroyed societies in the past and why this is important to them now. One of the ways we will do these things is to investigate literature that has been written around and about these types of events and how they affected people.

Some of the methods I intend to employ to teach these things are reading for critical thinking skills, writing with expression, and studying the sociological effects upon cultures of people where major catastrophes have occurred. Collins states "reading offers the potential for higher level thinking. Essential to the success of higher level reading is the reader's ability to relate new information to what is known in order to find answers to cognitive questions" (1).

To help the students relate to the types of events being discussed, we will read *The Big Wave* by Pearl S. Buck, which is a narrative about a young girl's experiences during the flooding of her home land during a tsunami in Japan. We will read *The Big Wave* in a literature circle setting as well as other offerings on the same subject matter, some of which may be expository texts. We can relate this to the experiences that some of the students may have had during the tropical depression Allison, which caused major flooding in Houston. We can expand upon this by allowing the students to create varied forms of writing to express their ideas and feelings about the event. Haiku would be an excellent art form in Japanese style poetry to use as a writing exercise.

Another writing exercise could be the creation of a disaster plan and the execution of safety precautions. They could create a list(s) of materials needed in case of a geological hazard(s). The students could develop their own vocabulary lists to fit their own needs and interests and create small group activities, such as Concentration, to help increase work familiarity and knowledge. They would also be able to develop word webs with synonyms, antonyms, create idioms, metaphors, and similes. This would help them build a vocabulary to assist with more varied and concise language in their writing skills. Vocabulary skills and development are very important to second language learners or bilingual speakers. At my school we have a large population of dual language speakers who need to have an extensive vocabulary built to help them in communication. Many have a limited vocabulary in their native language; therefore, it becomes imperative that they develop a vocabulary to help improve communication in both languages.

Inasmuch as my teaching area is reading and social studies, we will also investigate different literature sources that are written as a result of these types of hazard occurrences. We will do a research project on the possibility of the existence of Atlantis and read some of the literature about it. Their writing skills could also be expanded in this project by creating a possible solution to why/how Atlantis disappeared or if in fact it ever existed. The students can even create a fictional scenario about how the city was destroyed. They will investigate the possible location of Atlantis. Was it an island or part of a continent? How does the destruction of a civilization affect the world around it? How would this apply to our world and us now? We also do a unit on expository text in which we could use the science text for their class to do some reading and research into the different types of hazards. Plus we will do some of our work on line for research purposes.

GEOLOGIC HAZARDS

Some major geological hazards include volcanoes, earthquakes, hurricanes, tornadoes, and floods. Not all of these are predictable and the best that can be done is to be prepared and have an emergency plan created just in case. The ability to do this is one of the things I would teach.

Flooding and Hurricanes

Flooding is one of the hazards that are in a large part predictable and can be managed to a degree. Flooding always occurs in the lowest lying areas when there is excessive rain or drainage. There is usually a standard weather pattern that is a frequent occurrence in the area and residents are mostly knowledgeable of the fact. There are many things that can be done to minimize the effects of flooding, such as dykes, dams, levees and redirecting the flow of the river or stream. Learning how to make the decisions for what is the best remedy is a step in the right direction. Having knowledge of what those remedies are, their definitions and a familiarity with the terms, is the first step in that direction.

An example of a flooding disaster in the Houston area was during Tropical Storm Allison. The majority of downtown Houston was flooded, billions of dollars worth of damage was done and several people lost their lives simply because they didn't know how to react in that type of emergency situation. The *Wikipedia* re-tells the account of a woman who drowned in an elevator because she didn't realize the sub-basement parking garage was flooded and took the elevator to get to her car. These are the kinds of simple, easy to learn things that children need to be trained to think about. If they don't learn them early and practice them occasionally, it could cost them their lives.

Today's technology is also making hurricanes and tornados more predictable. Knowing how these events are created by weather patterns, water temperatures (both ocean and large areas of fresh water inland), and the humidity and air temperature will help the students acquire knowledge about the probability of such an event. This, in turn will enable them to arrange their lives in such a manner so to avoid catastrophe or at least diminish its effect upon them. By knowing how to set up an emergency preparedness plan, they will be able to have escape routes and supply lists prepared in advance and have needed materials on the ready, therefore, being as prepared as one can be in those types of situations.

The worst natural disaster in terms of loss of life in the United States occurred in Galveston, Texas, a city fifty miles south of Houston, in 1900. The Gulf Coast area is often a prime target for hurricanes and being prepared is a necessity of life in this area. Having knowledge of a recurring event often removes much of the mystery. This allows the children to begin to overcome unreasonable fear and know how to make plans to circumvent possible dangerous situations, allowing them some control over their situation. Another lesson about how this storm caused a difference in the economic status of Galveston can be directly traced to the aftereffects of the storm. With the onset of the oil boom to occur within the year following the 1900 storm, the lawyers and business assets needed by Beaumont were not available in Galveston where most would have looked for help. Galveston was too busy cleaning up after the storm, so Beaumont businessmen had to go to Houston to find the support needed. This encouraged Houston businesses to push for dredging a channel to create a Houston port, which is now one of the larger ports in the United States, especially for import and export of oil products.

Earthquakes

Earthquakes have caused some of the greatest losses of life in the 20th century. They cannot be predicted at present nor can they be prevented. They are, however, more likely in some areas more than others. The Indonesian Tsunami of December 2004 was a combination of two geological disasters. An earthquake occurred on the ocean floor, which resulted in a

displacement of the water above the earthquake site (epicenter). The water traveled along the ocean floor and began to rise as it approached land. The rising water caused unexpected flooding in the surrounding areas because the earthquake had not been immediately noted as it would have been had it occurred on a solid land mass. The result was almost 300,000 people killed!

The onset of an earthquake is not as easily detectable as is flooding or hurricanes, but the knowledge of where they are likely to occur and the frequency in those areas can perhaps give the student some information to build on and make informed decisions. Peg Kehret creates an example of how literature might help the student with this in *Earthquake Terror*. This is a fictional account of how a young boy overcomes the unexpected obstacles of an earthquake and flood after being left to care for his younger disabled brother during an emergency situation. The tale recounts how the main character deals with the situations as they arise and his thought process throughout the ordeal. This would give the students a good example of how to use logical thought processes to overcome obstacles and how to express emotion in writing.

This is an area where building codes have created a change in the way that houses are being constructed in areas that are prone to these types of natural disasters. The changes in construction and building code can cause a major change in the length of time needed in the construction, and cost. Some people, who are not ready to meet the financial obligations of building a home or business, now will be able to arrange their finances to better fit their needs. They will also be able to create a time frame for completion of the projects they have planned. This can be observed by doing a price comparison between similar sized houses/businesses in different areas that have the same types of amenities. Small three bedroom houses with two baths may cost $100,000 in some upscale urban cities but in California may cost as much a $1,000.000. Some of this has to do with building code requirements and part of it is due to location and cost of living.

There are several places in the continental United States where fault lines lay, the most well known being in California. Tremors are not uncommon along the San Andreas Fault. There were major earthquakes along this fault zone in 1989 and again in 1994, causing great destruction and significant loss of lives (Levy and Salvadori 101). There was also one in 1906 that caused the near destruction of San Francisco due to ruptured gas lines, which caused a fire that burned the majority of the city. Only the buildings that were built of stone or brick survived in any fashion. There are, however, some more poorly known faults lying on the eastern seaboard of the United States in South Carolina. These have not been as active as the ones on the west coast of America, but there is no guarantee that an earthquake will not happen. In fact, it most likely will happen, we just don't know when. But with the knowledge that a catastrophe is in the making, plans can be constructed to limit the danger as much as can be done with the means and knowledge we have now. As the science of geology is explored and understood to a greater degree, the means to make predictions is enhanced. This makes the probability of predictions more accurate and the ability to create viable solutions more on target.

Volcanoes

Volcanic eruptions are one of the most spectacular geological hazards. Volcanic eruptions are more predictable than earthquakes due to seismic equipment and close monitoring of known active volcanoes. Active volcanoes are usually found along convergent or divergent plate boundaries. When there is a shifting in the plates an earthquake occurs. After this shifting there may be a gap between the plates, which allows the escape of magma from the earth's core. This is a very simplistic description of the event of the volcanic action. Depending upon the location and type of action, three distinct types of volcanoes are created: the shield, the composite or stratovolcano, and the cinder cone volcano.

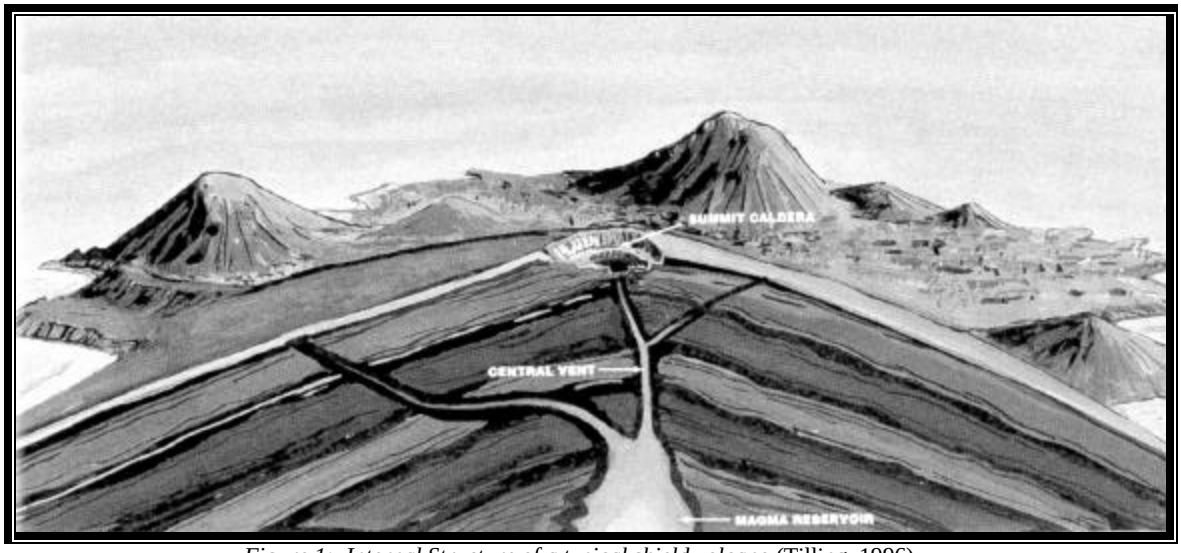

Figure 1: Internal Structure of a typical shield volcano (Tilling, 1996)

Of the three types of volcanoes, the shield volcano (*Figure 1*) is the largest. It can spread out for miles and is mostly formed by liquid lava emerging from a fissure and building up to form a mountainous landform over a period of years, perhaps centuries and several eruptions. The shield volcano is mostly composed of basaltic material. Some of the most famous shield volcanoes are found in the island state of Hawaii. It is from a few of these volcanoes much video footage has been filmed of actual eruptions. There have been continuous eruptions over the course of centuries there, averaging an eruption every two or three years, making it easier to avoid catastrophe.

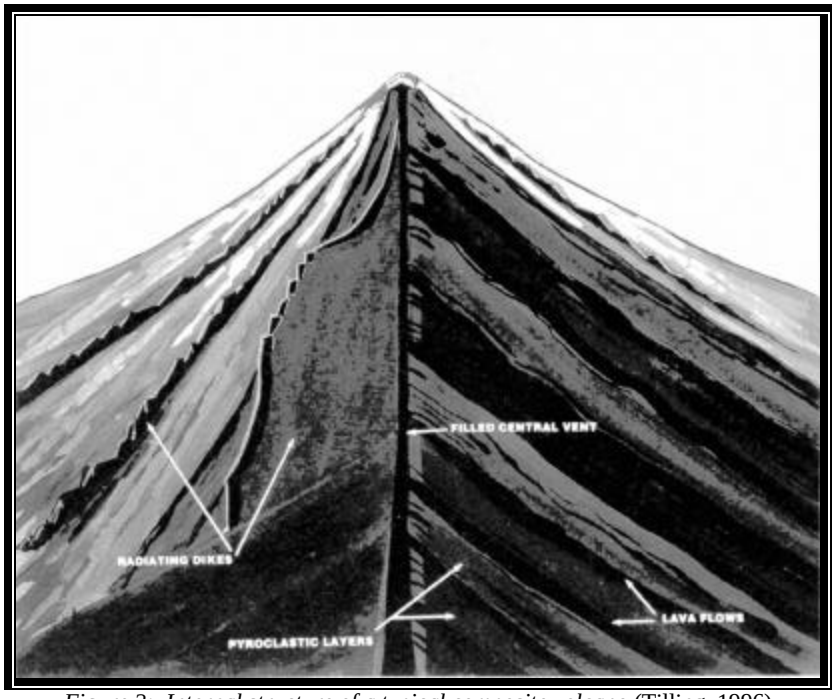

Figure 2: Internal structure of a typical composite volcano (Tilling, 1996)

The composite volcano (*Figure 2*) is typically the most violent type, with the most deadly eruptions. This type of volcano spews various sizes of rock (called bombs or blocks), deadly gases, and ash, which can bury an entire countryside. After the initial explosion or in subsequent

eruptions, lava flows from the volcano over the ejected materials forming a composite layer, hence the name. The lava flows in this kind of volcano are mostly andesitic or rhyolitic and are more viscous than the basaltic flows of the typical shield volcano. This creates a steeper slope than that of the more fluid basaltic shield volcano. A growing bulge in or around the volcano itself (such as occurred prior to the eruption of Mt St Helens in 1980) may herald the onset of the eruption of this type of volcano. The composite volcano can lie dormant for centuries, creating a decreasing awareness of the violent nature of the landform in the surrounding communities, thereby creating the possibility of even greater danger because of complacency.

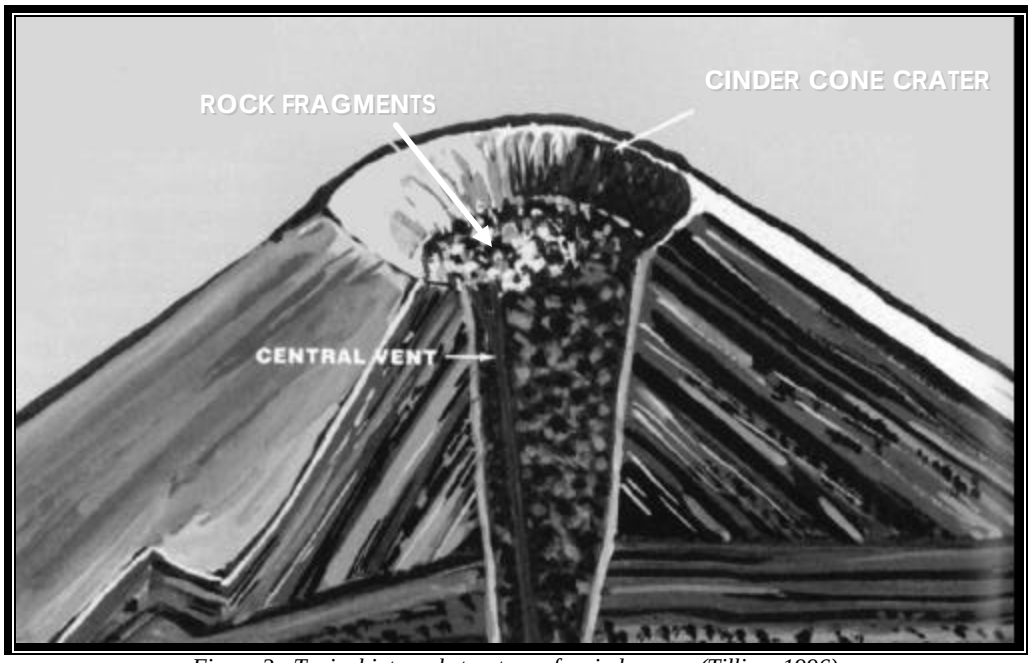

Figure 3: Typical internal structure of a cinder cone (Tilling, 1996)

The cinder cone volcano (*Figure 3*) is considered to be the simplest type of volcano. It is formed by an eruption from a fissure in the earth's crust, spewing magma via escaping gas into the air forming blobs of cooling materials that form into cinders. The cinders fall back to the ground around the fissure area causing a volcano to form. One of the most astonishing occurrences of this type of formation took place in Mexico in the 1940's. The fissure was just an unexplained hole in a farmer's cornfield and at the end of the event one year later was a cinder cone volcano measuring 1100 feet high. These types of eruptions can also occur with basaltic lava forming plains of lava. The composite volcano and the cinder cone volcano are similar in shape because they are formed in a similar manner, by the build up of layers around the initial explosion of matter.

By gaining knowledge of what, how and why natural geological hazards occur, students will have a broader understanding of their world, how to live in it and how to prosper. Obtaining background in elementary school can serve as a foundation for students to build on in other areas in their academic career, as well as in their later lives, and hopefully encourage them to be life long learners.

The importance of developing life-long learning habits is often under estimated. With the average life span of people being longer in first-world countries than it has ever been before, the need for natural resources has expanded. The ability to conserve and recycle what we already have is becoming more imperative. The world population is growing exponentially and the demand for food and shelter is greater than it has ever been. The need to better control our world is becoming of necessity high priority. The ability to span the globe is becoming quicker and

easier as technology is expanding and is more readily available to the common person. Anyone with Internet access can now view the opposite side of the world in real-time if the equipment is in place. The need to constantly readjust our worldview becomes an obvious observation to those with an eye to world cohabitation. I have included CLEAR (Houston ISD curriculum) objectives with each lesson plan to help in planning and notating in lesson plan books for use in individual classrooms.

LESSON PLANS:

1. Literature Circle: Choose 4-6 titles depending upon the size of your class and allow the children to choose the title they would prefer to read. Introduce the groups and have them determine the jobs for each member of the group (leader, vocabulary person, illustrator, literary guide) and have each member of the group understand the requirements of each position since the jobs will rotate in order for each person to have a chance to do each function. Have the group set up a written schedule, including reading requirements (how long and what chapters should be read within a time frame) that they all agree with and sign. Allow the students time to read either in class or as homework (if you trust them to return with the books). Have the groups meet on assigned days to discuss their reactions to the material. (You can generate discussion questions if you think necessary or get them from a teacher's guide to the book if available). Have them keep journals about what they have read and discussed to assess the group's work. Create a rubric of your expectations and the levels for grades. This way the student will know what to do to earn top grades.

Project CLEAR Objectives

English Language Arts Listening and Speaking (ELAL)

Goal 1 The student will develop strategies to listen and respond attentively, actively, and purposefully in a variety of settings for a variety of purposes.

ELA.L.5.1.a. Listen for a variety of purposes.
ELA.L.5.1.b. Listen actively, attentively, and purposefully.
ELA.L.5.1.c. Analyze and evaluate spoken and recorded messages.
ELA.L.5.1.d. Initiate and sustain conversations and discussions with peers, parents, and teachers and other adults.
ELA.L.5.1.e. Question to clarify or gain further information.
ELA.L.5.1.f. Provide and follow precise, complex instructions and directions

English Language Arts Reading (ELAR)

Goal 2 The student will develop and extend the foundations of reading. (K-8)

ELA.R.5.1.a. Use a variety of word recognition strategies.
ELA.R.5.1.b. Read with fluency and understanding in texts at appropriate difficulty levels.
ELA.R.5.2.a. Describe and compare the characteristics of a variety of texts, forms, and genres.
ELA.R.5.2.d. Analyze narrative text structure and its features.
ELA.R.5.2.e. Analyze expository text structure and its features.
ELA.R.5.2.g. Identify and analyze a variety of literary devices.

Obviously these can be rearranged to suit the purpose of the lesson.

2. Have your students write a short narrative about being caught in some type of natural disaster. Have the student create a scenario where s/he is caught and how they would escape from this situation. What they would do and how they would feel? Have them detail how they may have prevented the occurrence and foretold its possibility. Create a rubric to score the assignment.

ELA.R.5.8.a. Develop relevant questions pertaining to a specific topic to investigate through reading.

3. Introduce the form of Haiku poetry to them and have them create a poem about the book they have read or their feelings about the book. They may wish to write about the disaster itself. You may wish to display these on special occasions using a display the children have created to represent the poem. A rubric is suggested to score the student's efforts.

ELA.W.5.2.a. Select appropriate form(s) for composition, with respect to considered purpose(s) and audience(s).
ELA.W.5.2.d. Write for personal expression and reflection.

4. Help the students create lists for emergency preparedness. List places to go for help, items necessary for loss of electricity or water, and places to go for evacuation. Have the students map an emergency exit route for the house or for leaving town. The newspapers are good sources for this type of information. This is also a good exercise to help with map reading. The use of a rubric is suggested for assessment purposes.

ELA.R.5.8.c. Summarize and organize information in systematic way

5. Start a research project on Atlantis. Have the students do research on what or where Atlantis was or if it existed. Have them to write a persuasive paper to convince the reader of their point of view. Have them to create a map of what they thought Atlantis might have looked like and what the people who lived there would have been like. Include in the research project a bibliography page. Use a rubric for assessment.

ELA.L.5.2.b. Analyze and evaluate standard grammatical structures.
ELA.L.5.2.d. Interpret and evaluate the literary elements of language.
ELA.L.5.2.g. Speak with increasing command of English when English is a second language

Goal 3 The student will communicate clearly, appropriately, and effectively for a variety of purposes and audiences.

6. Have the students do research on large-scale disasters. Let them present the information learned to the class. They can do project boards, reports, visual presentations etc. to show the class. Use the rubric method to assess the student's work. You may decide to let the students work in groups for some of these projects.

ELA.L.5.3.a. Choose and adapt spoken and non-verbal language appropriate to the audience and purpose.
ELA.L.5.3.b. Prepare, organize, and deliver a variety of oral presentations.
ELA.L.5.3.c. Clarify and support his/her own oral communication.

7. Have the students locate and map areas known for geological hazards. Let them research ways to co-exist with the hazards and ways to overcome possible obstacles to live there or discuss if that would be a good thing to do. Let them discuss/discover if what possible outcomes would be and if those would be good for them or the environment. Rubric is the suggested tool of assessment.

ELA.L.5.2.c. Assess the uses and functions of language in literature and spoken messages
ELA.L.5.2.e. Use novel and flexible language approaches

Goal 4 The student will participate actively in language acquisition and development activities.

8. Have the students create a vocabulary notebook to list all of the new words they have encountered during their studies. Have them to list part of speech, root word, and at least one or two definitions. I would suggest the use of a word web for this activity, including synonyms, antonyms and the language of origin for the word used. The completion of the word web would be scored on a met standards rubric.

ELA.L.5.2.a. Develop specific vocabulary to suit specific purposes.
ELA.R.5.3.a. Develop vocabulary using a variety of strategies.
ELA.R.5.3.b. Use structural analysis to identify words and determine their meaning(s).
ELA.R.5.3.c. Use a variety of strategies to support word identification and confirm word meaning.
ELA.R.5.3.d. Use a variety of resources to build vocabulary, determine word meaning, and confirm pronunciation.

BIBLIOGRAPHY

Works Cited

"Bleak Demand Frustrates Produce Growers." *Southeast Farm Press*. Vol. 32, Issue 6, 2005: 12 Retrieved from EBSCO host March 21, 2005.

Buck, Pearl S. *The Big Wave.* New York: Harper Trophy, 1986.

Collins, Norma Decker. *Teaching Critical Reading through Literature.* ERIC Digest 1993. ED363869. Retrieved from ERIC Digests July 3, 2003.

"Emergency Response Awards." *Electric Perspectives Magazine*. 30, Issue 2, Apr. 2005: 8. Retrieved from EBSCOhost March 21, 2005.

"Insurers Pay Record Cat Losses in '04." *Insurance Advocate.* Vol. 116, Issue 5, 2005: 26. Retrieved from EBSCOhost March 21, 2005.

Keheret, Peg. *Earthquake Terror*. New York: Harcourt, 1996.

Levy, Matthys, and Mario Salvadori. *Why the Earth Quakes*. New York: WW Norton and Co., 1995.

Manning, Maryann and Gary. *Literature in the Content Areas. Teaching* , PreK-8 1995 Vol. 26, Issue 3. Retrieved from Ebscohost June 11, 2003.

Martinez-Roldan, Carmen M., and Julia M. Lopez-Roberson. "Initiating Literature Circles in a First-Grade Bilingual Classroom." *Reading Teacher*, v 53. December 1999/January 2000: 270-281. Retrieved from EbsocoHost 6/11/03.

Padilla, Michael J., Miaoulis, Ioannis, and Cyr, Martha . *Science Explorer Grade 6.* Upper Saddle River, NJ: Prentice Hall. 2002.

Tilling, Robert I. *Volcanoes.* Washington: U.S. Government Printing Office, 1996.

"Tropical Storm Allison." *Wikipedia*. Retrieved from www.google.com. July 7, 2005.

Supplemental Resources

American Red Cross. *Children, Stress, and Natural Disasters*. Retrieved from <http://www.ag.uiuc.edu/~disaster/teacher/teacher.html>.
Gives information on how to help children deal with stress, what to look for and things teachers should do.

Berry, Joy. *About Disasters*. New York: Children's Press, 1990.

Brown, David K. (webmaster). *Children's Literature- Resources for Teachers.* <http://www.hcs.ucalgary.ca/~dkbrown/rteacher/html>.
Lists of books available with comments/blurbs.

---. *Children's Literature-Best Books List.* Retrieved from <http://www.hcs.ucalgary.ca/~dkbrown/lists.html>. Lists of books available with comments/blurbs.

Carrick, Carol. *The Washout*. New York: Seabury Press, 1978.

De Boer, Jelle Zeilinga, and Donald Theodore Sanders. *Earthquakes in Human History: The Far-reaching Effects of Seismic Disruptions*. Princeton: Princeton University Press 2005.

---. *Volcanoes in Human History: The Far-reaching Effects of Major Eruptions.* Princeton: Princeton University Press 2002.

Fradin, Dennis. *Floods*. New York: Children's Press, 1982.

Fredericks, Anthony. *Investigating Natural Disasters through Children's Literature.* Linwood, KS: Teacher Ideas Press, 2001.

Gilson, J. *Hobie Hanson, Greatest Hero of the Mall*. Boston: Lothrop, Lee and Shepard Books, 1989.

Knapp, B. *Flood*. Austin, TX: Raintree Steck-Vaughn, 1990.

Larson, Erik. *Isaac's Storm.* New York: Vintage Books, 2000.

Lee, R.C. *The Day it Rained Forever*. New York: Little Brown and Company, 1968.

Pike, Lynn Blinn, PhD. "Children's Literature on Floods and Natural Disasters." Univ. of Missouri. May 1, 2005. <http://www.ag.uiuc.edu/~disaster/teacher/flood.html>. Links to age/grade appropriate books.

Prager, Ellen J. *Furious Earth The Science and Nature of Earthquakes, Volcanoes, and Tsunamis*. New York: McGraw Hill, 2000.

Ritchie, David & Gates, Alexander E. *Encyclopedia of Earthquakes and Volcanoes*. New York: Checkmark Books, 2001.

Sanacore, Joseph. "Whole-Language Grouping that Works!" *Education Digest 1993* Vol. 58. Issue 5. Retrieved from Ebscohost June 11, 2003.

Stevenson. E & Stevenson J. *Help! Yelled Maxwell*. New York: Greenwillow Books, 1978.

Stoltz, M. *Storm in the Night*. New York: Harper and Row, 1988.

Thompson, Luke; Cesar, Jennifer; and Kirkpatrick, Rob. *Earthquakes*. Scholastic Library, 2000.

Tresselt, A. *Rain Drop Splash*. New York: Lothrop, Lee and Shepard, 1946.

"What's Growing on in Storm Aftermath." *American Nurseryman.* Vol. 201, Issue 5, 2005: 11. Retrieved from EBSCO host March 21, 2005.

Winchester, Simon. *The Day the World Exploded: August 27, 1883 Krakatoa*. Great Britain: Viking, 2003.

Zebrowski, Ernest Jr. *The Last Days of St. Pierre: The Volcanic Disaster That Claimed Thirty Thousand Lives*. New Brunswick: Rutgers University Press, 2001.