Earthquakes and the construction of buildings

The activities are designed for students in 6th thru 8th grade.

The main idea for the Japan project will pertain to earthquakes. I will start the project by giving the students a copy of the country Japan. I will have the draw in the major tectonic plates that are located in the country. I will then have them put in some major cities (Kobe, Tokyo, Kyoto...just to name a few). I will have them highlight Kobe because that is the place of the last major quake.
This will be my introduction activity...it should take about 15-20 minutes.

A modification for this activity can be that you can put in the major tectonic plates and have the kids just highlight and name the major plates.

The next activities will be hands-on.

1. This will deal with having a stable foundation or a stabilizer to help a building. I will show the location of Kobe and talk about how the docks were first built on sand. (I will have six ice cream buckets filled with sand and water- one for each table). I will give each group a house and they will put that on top of the sand. I will have the students shake the buckets and the house will sink (shake about 3 minutes). I will then have stop and discuss what can be done so they don't sink. If no solution is found or is plausible I will give them a rod to attach to the bottom of the house to see if it keeps it up on the surface. They will shake again for 2-3 minutes and add more water. The second solution will be to add a rock or a block of wood to simulate anchoring the house to solid ground. Again they will shake it for 2-3 minutes. After they finish I will have them compare how the houses reacted to each situation. I will then discuss how after the earthquake they built the docks on a more solid foundation.
2. The second activity will be how the houses were built. I will have each table (or group of 4) Build a 3-story house out of k-nex. I will then have them tape the structure down with tape and shake the table for a minute. I will then discuss with them how the structure performed. Is that a good thing for the foundation, will the building stay standing if another occurs, will there be damage….questions to ask. I will then have them problem solve things to help the building. I will then have them try their ideas and see how they work. Or you can skip this step and have them construct an X and insert that on the bottom of each structure. They can then shake the table again and see how the house has become much more stable. Total time for this activity should be 45 minutes.

3. The final activity will be to build houses. I will have the students build two stick houses out of Popsicle sticks. On the top of one house I will have them add just a sheet of paper on each side of the house to simulate the roof. This is the roof of a modern house that is located in Northridge California. The second house I will have them add a heavy brick to simulate the houses in Kobe. I would now discuss the houses in Northridge were modern and made to be earthquake proof. They are reinforced and built on a solid foundation in California. The houses of Kobe are old houses and they were not built to withstand an earthquake. The roof, which is simulated by the brick, is built to withstand typhoons and the heavy rains. To finish the activity I will have the students shake the table until the house or houses collapse. I will have them discuss the outcome and what can be done to educate or help the people of Kobe who still

have the older style houses. The total time for this activity will be 60 minutes. An alternative to this activity could be you (teacher) build one house and the students build the other. Ask which house would belong where and why.

The Wisconsin Standards covered are: Standard A.8.6&8.7, Standard B.8.3&8.6, Standard C.8.1,8.4,8.5 and 8.9,Standard D.8.2,StandardE.8.3 and 8.4, Standard F.8.2 and 8.3 and Standard H 8.1.

As a way to teach the students how kindness, respect and understanding can help to facilitate a situation… I will set up a mock Shubuya Square. At the Junior high level the kids are so concerned about image and being popular. They don't always remember to treat others how you would like to be treated. I will first start with a 4-way intersection with two people at each one and have them cross to the other side. I will then add more people and more intersections and see how they react. I will then have them discuss how they felt as more people and intersections were added. I will then show them the scene from "Lost in Translation" the Shibya crossing so they can see how it really works. An alternative could be to just show the clip and discuss. Why does this work? How would you feel crossing here? Do you think people get upset? The time frame for this is activity 20-30 minutes.

In all this activities the students will:
Problem solve-identify different ways to construct and reinforce
Identify the problems with houses in our area versus an earthquake prone areas
Observe how houses react in sand during an earthquake, how houses react without reinforcements and with stabilizers.
Search for ways to build houses better and how to educate people to why it needs to be done
Analyze why Shibya square works

Objectives for the Earthquake activity: 1) Understand the different types of earthquakes and the impact they have.

2) Understand why an earthquake can affect different parts of a city.

3) Understand the importance of construction design in consideration of a city.

For background information I would show the YouTube videos: Northridge earthquake of 1994 and the Kobe earthquake of 1995. I would then talk about the lack of damage and the lower death rate in Northridge. It was due to the better construction of the houses in California. In Kobe the older houses were not made earthquake proof and they had heavy ornamentation (family seal on top of the old houses). The highways in both cities were heavily damaged if the foundations were not reinforced.

I would also go to: www.discoveryeducation.com and put in earthquake lesson plans. They have a great mini lesson to get the kids some background information.