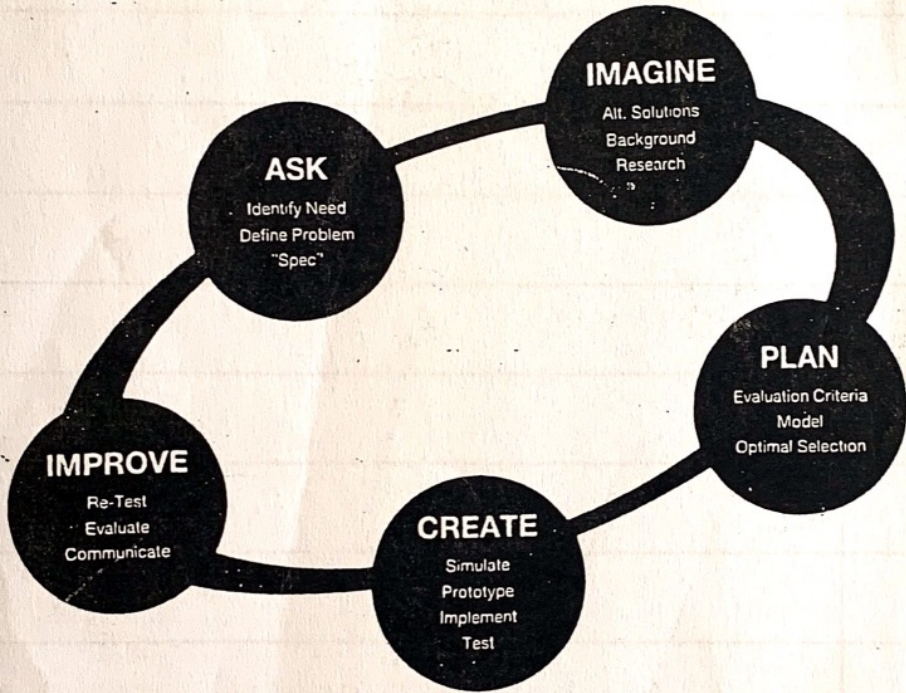


Engineering Design Process Engineering Notebook

Earthquake Structure Design Challenge



Museum of Science (Image creator). (2016). The engineering design process [Diagram]. Retrieved from <http://www.eie.org/overview/engineering-design-process>

Table of Contents (to be completed at the end of the EDP assignment)

Description	Page Number

Scenario

When an earthquake occurs, many buildings are not structurally sound and get destroyed, especially in Third World Countries. So when an earthquake hits, buildings are destroyed lives are lost. Third World countries have high poverty rates (poor) and high mortality rates. They also lack ~~human~~ needs, like no or limited access to water, shelter and food. They build structures as cheaply as possible, so when an earthquake hits, the structure falls.

ASK

Problem Statement

Problem Statement: To design and build a 3 story, two foot tower that will withstand a simulated earthquake for 20 seconds.

Specification Sheet

Justification – The reason why this is a specification based on the engineering design challenge or the customer’s needs.

Weight: Number assigned to a specification based on its importance (on a scale of 1 to 5, with 5 being the most important)

#	Specifiations	Weight
1	Tower should use only the provided materials.	3
2	Tower is at least two feet tall.	5
3	Tower has 3 stories.	5
4	Tower can withstand a simulated earthquake for 20 seconds.	5

IMAGINE

Problem Statement

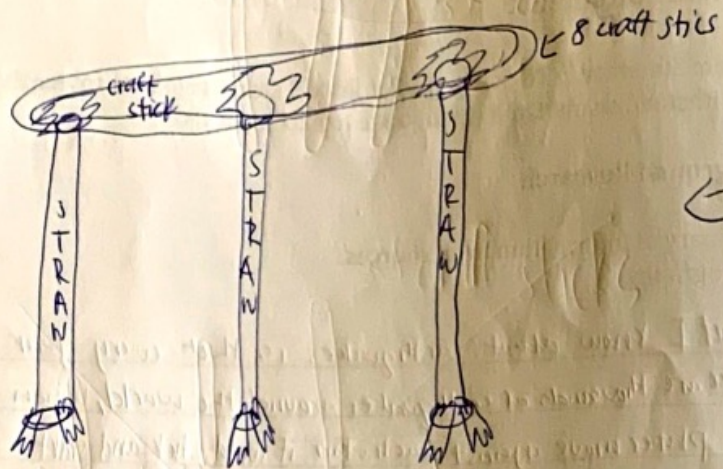
Problem Statement: To design and build a 3 story, two foot tower that will withstand a simulated earthquake for 20 seconds

Background Research

- Summary of information from sources
- Bibliography

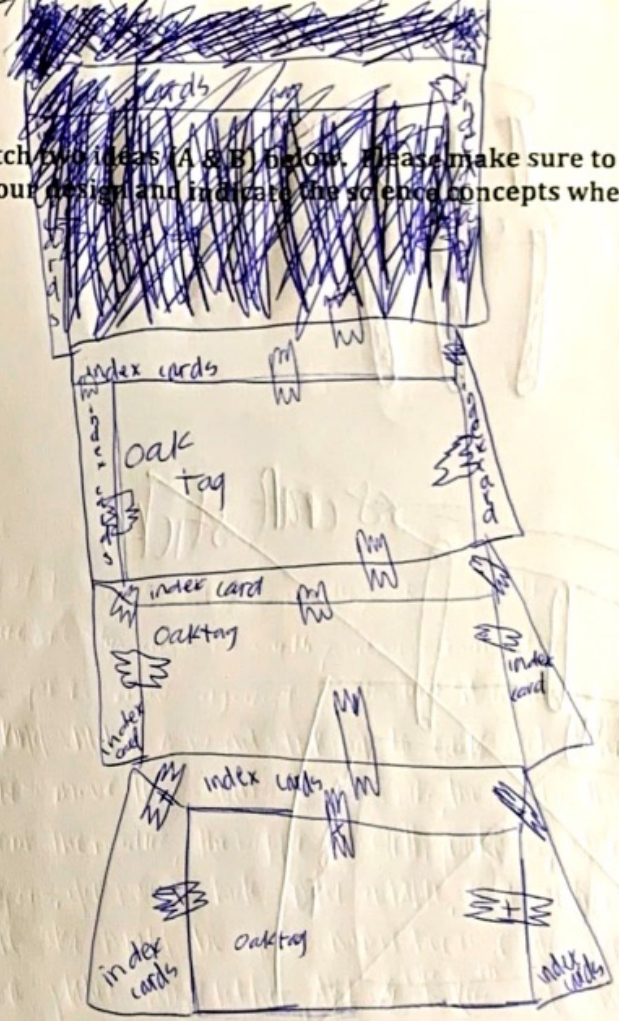
What I know about earthquakes is that every year there are thousands of earthquakes around the world, when the plates move against each other it could stick and start shaking until it is not sticking to ~~each~~ each other, as the plates move there starts to get cracks, the bigger the lines are from the needles, the bigger the earthquake is, when a earthquake happens, you have to hide under a table, if a earthquake happens, there also might be a tsunami because ~~the~~ when the two plates rub together, ~~the~~ ^{the earth} shakes and the waves combine together, if a earthquake is big there is a chance that there could be a big tsunami, too! when the plates rub together, a bad earthquake can happen, a huge tsunami could happen, and probably all of the buildings could fall down and you won't have a house if all of the buildings fall, and probably everyone can loose there life because all of the buildings could fall on you, or you could drown from a big tsunami, in an ~~earth~~ Page 6 earthquake, every thing from the store and just everything could fall down, ~~if an alarm rings that means~~ you would have to be prepared if there is an earthquake because it might last all day or a couple of days. the bigger the earthquake is

the more dangerous it is, because the earth or island could shake more, and more people could get hurt because the more damage the more people could probably lose their **WHOLE ENTIRE LIFE!**

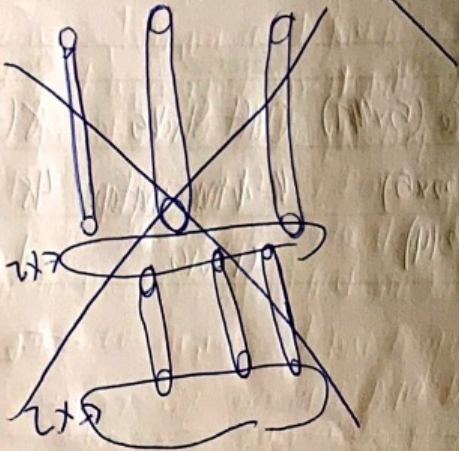
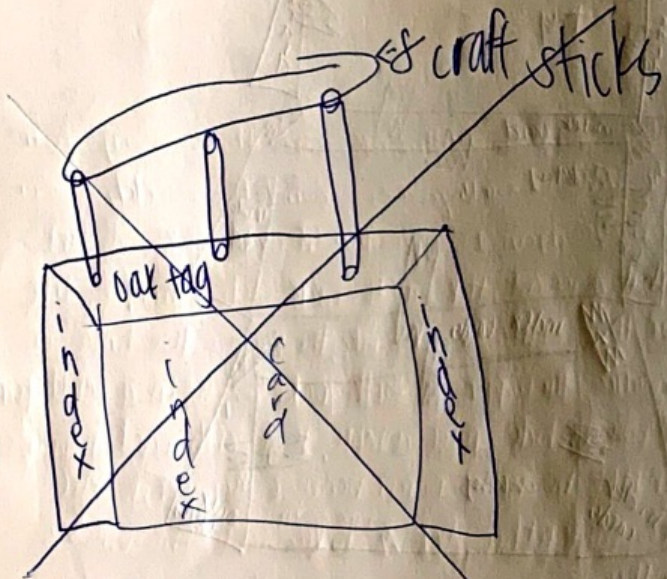
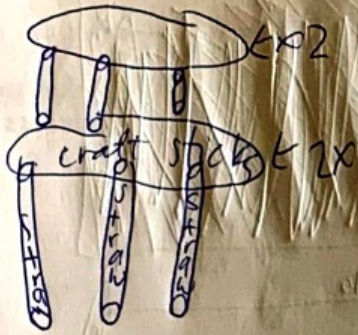


Sketch two ideas (A & B) below. Please make sure to include labels in your design and indicate the science concepts where they apply.

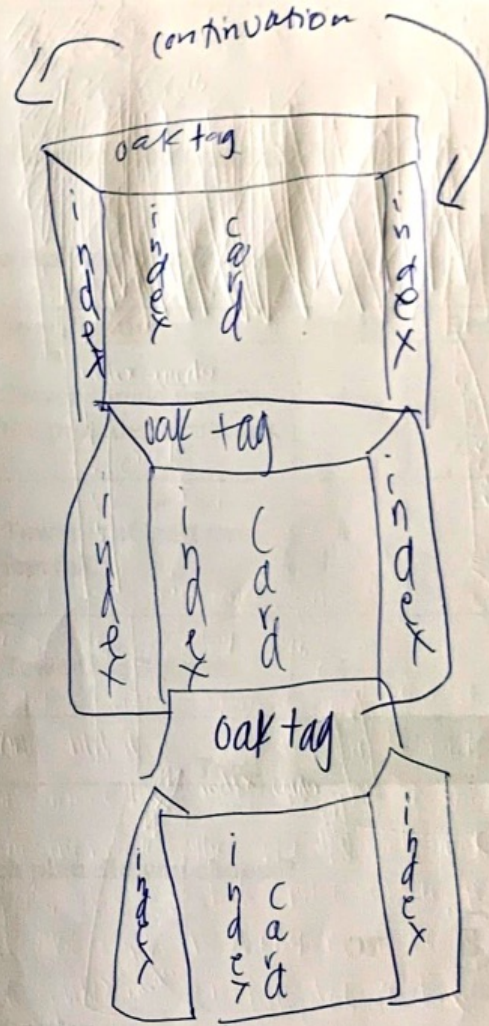
A



Material	Quantity	Material	Quantity
Oaktag	6 (5x7)	Craft Sticks	8 (4 1/2)
index cards	12 (3x5)	#1 masking tape	48
Straws	8 (7 3/4)	Scissors	1 per person



B



Material	Quantity	Material	Quantity
Oak tag	4 4	index card	12
straws	4 4	craft sticks	8
scissors	1 per person	tape	"48"

Pugh Chart (decision matrix)

Please evaluate specifications.

	Specifications	Weight	Design A		Design B	
1	Tower should use only the provided materials.	4				4
2	Tower is at least two feet tall.	4				4
3	Tower has 3 stories.	4				4
	Total					12

Which plan did you choose?


A or **B**

Justification

Me and my partner chose B because we think it is going to be taller than A and we think it is going to be better than our first build. We also think that our plan B is going to hold during the "earthquake"

Clearly Write Out the Steps for Executing the Design

(These instructions should be clear enough to allow someone else to follow them. Use illustrations if necessary to make the instructions clear.)

First, we are going to get our supplies. Next, we are going to lay ~~the~~ an index card on the table and then we are going to tape ~~the~~ masking tape the other index card on the side and ~~on the~~ in the front of the index card that you lied on the floor!  Then, we are going to put the oak tag on the top and just keep repeating it 2 more times! Last, we are going to put the straws on top the last tower then we are going to put two craft sticks and tape them together and then do the same thing 1 more time! 😊

List Your Materials

Material	Quantity	Material	Quantity
Oak tag	6	Craft sticks	8
index cards	12	# tape	"48"
straws	8	Scissors	1 per person

CREATE

Problem Statement

Problem Statement: To design and build a 3 story, two foot tower that will withstand a simulated earthquake for 20 seconds.

Scoring Sheet

Criteria	Exceeds 5	Meets 3	Needs Improvement 1
1. Materials		The tower used only the provided materials.	The tower used other materials than what was provided.
2. Height		The tower is two feet tall.	The tower is under 2 feet tall.
3. Stories		The tower has 3 stories.	The tower has less than 3 stories.
34 Durability	The tower can withstand a simulated earthquake for more than 20 seconds.	The tower can withstand a simulated earthquake for 20 seconds.	The tower did not withstand a simulated earthquake for 20 seconds.

	Specifications	Weight	Score	Weighted Score= Weight x Score
1	Tower should use only the provided materials.	3	3	9
2	Tower is at least two feet tall.	5	1	5
3	Tower has 3 stories.	5	3	15
4	Tower can withstand a simulated earthquake for 20 seconds.	5	1	5
	Total			34

Test Data

Date 3/9/2020

Two feet tall Yes or No

3 stories Yes or No

Time the tower withstood the earthquake 5 seconds

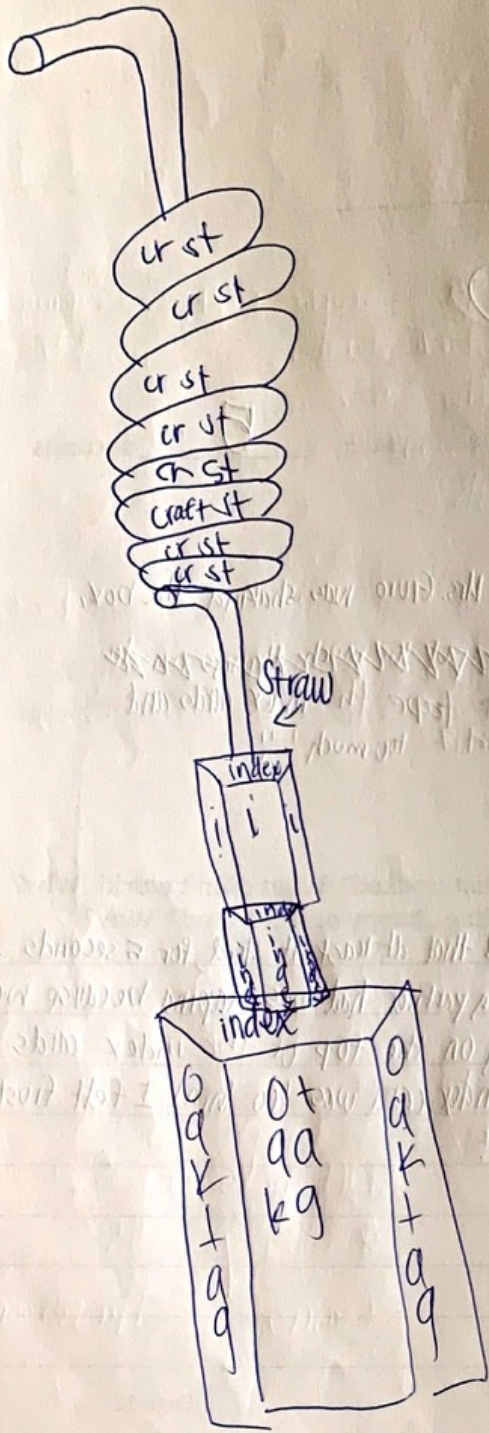
Observations

I observed that ~~the~~ when Mrs. Guro was shaking the box, it started to fall because ~~we put too much things on it~~ we ~~did not~~ probably did not tape the index cards and oak tags and we probably coted it too much!!

Student Reflection

(Successes and Challenges: What worked? What didn't work? Why? How you felt as you were building...happy or frustrated? Why?)

The thing that worked is ~~that~~ that at least it stood for 5 seconds and the challenges me and my partner had was taping because we could not tape the oak tag on the top of the index cards because the top of the index card was too thin! I felt frustrated because again the tape!

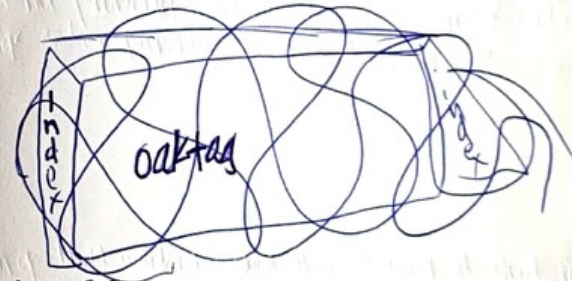


IMPROVE - PLAN

Problem Statement

Problem Statement: To design and build a three story, two foot tower that will withstand a simulated earthquake for 20 seconds.

Sketch your new Design (include labels)




Description of the Design Change and Justification

~~was~~ We are going to change the places of the ~~new~~ materials because our last build, the straw and craft sticks were not staying together when we taped it!

Clearly Write Out the Steps for Executing the Design

(These instructions should be clear enough to allow someone else to follow them. Use illustrations if necessary to make the instructions clear.)

First, we are going to put an oaktag facing up and tape the sides like that too! Then, we are going to put an index card on the top for the roof! Next, we are going to do that 2 more times. ~~Then~~ Fourth, we are going to build 4 index cards and then put an index card on the top to make the roof!  (we are going to do that 1 more time on top of that one that we just built.) Fifth, we are going to put a straw on top of the index cards. Sixth, we are going to put craft sticks on top the straws! Lastly, we are going to put 1 more straw on the craft sticks!

List Your Materials

Material	Quantity	Material	Quantity
Oaktag (5 by 7 inches)	4	Index card (3 by 5 inches)	11
Craft Sticks (4 by 1/2 inches)	8	Straws (5 by 1/2 inches)	2
Scissors (48 inches)	Scissors (48 inches)	Scissors (1 per person)	Scissors (1 per person)

IMPROVE - CREATE

Problem Statement

Problem Statement: To design and build a three story two foot tower that will withstand a simulated earthquake for 20 seconds.

Criteria	Exceeds 5	Meets 3	Needs Improvement 1
1. Height		The tower is two feet tall.	The tower is under two feet.
2. Stories		The tower has three stories.	The tower has less than three stories.
3. Durability	The tower can withstand a simulated earthquake for over 30 seconds.	The tower can withstand a simulated earthquake for 20 seconds.	The tower did not withstand a simulated earthquake for 20 seconds.

	Specifications	Weight	Score	Weighted Score= Weight x Score
1	Tower should use only the provided materials.	3	3	9
2	Tower is at least two feet tall.	5	3	15
3	Tower has 3 stories.	5	3	15
4	Tower can withstand a simulated earthquake for 20 seconds.	5	1	5
	Total			44

Test Data

Date 3/12/2020

Two feet tall Yes or No

3 stories Yes or No

Time the tower withstood the earthquake 6 seconds

Observations

I observed that the the craft sticks made more pressure on the tower because we used to much of the craft sticks!

Student Reflection

(Successes and Challenges: What worked? What didn't work? Why? How you felt as you were building...happy or frustrated? Why?)

What worked is every thing and what did not work is the craft sticks. ME and MY PARTNER was Frostrated when we were building our house also it was frustrating when we were building the craft sticks and putting the straws on top of it.