

DEVELOPING A SCIENCE CURRICULUM WITH THE FOCUS ON BELONGING

by

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Project Summary

When answering the question, *how do educators develop a sense of belonging within a science curriculum?* The initial construction of this project was focused on filling every day with very specific tasks. As I dove further into the literature on belonging I began to understand how prescribed curriculum is what removed that belonging and feeling of connection in the first place. The construction of the project itself became the direct challenge presented to educators, and that is continued flexibility, and removing rigid planning. An outline of ideas and possibilities paired with an understanding that we as educators will need to move topics around or delete them entirely was the landing point for this project.

The final product is a soft outline of a full year in a classroom which specifically in this project is a sixth grade general science class, averaging around 30 students per class. The outline is set up for a school that runs on an alternating schedule with 90 minute blocks. Days are color coded to be research, content, and experiment days. This is where the specific planning is paused, because placing specific activities and lessons into the outline before we know the students in our rooms is maintaining emphasis on the teacher centered approach of how the year will look and develop. The only set events of the first week include introductions and the experiment highlighting failure as a crucial component to science, those lesson and lab plans are included below.

The research days are also set to where students will do their research on those days, working in three week cycles. All students will begin with the same question to research so the media specialist can show them how to move through their project in the

first three weeks. Then students will develop their own question from their findings, and continue that cycle every three weeks.

The research days and experiment days have alternating colors to specify when the research questions should switch after three weeks of focus (research graphic organizers are found below), and how experiments will repeat because the alternating schedule places different students in the Friday class.

Lesson Planning

Educators are encouraged to plan out lessons no more than three weeks in advance as the research and journal entries being submitted by students will point the curriculum in the direction of where the class is interested in going. During the content days, utilize Wiggins & McTighe's (1998) emphasis on backwards planning for lessons. Starting in what they refer to as "stage 1" (p. 9) where the goal is to identify what the educator is hoping to accomplish with the tasks, which should always be rooted in creating a sense of belonging.

Backwards planning allows for the educator to truly focus on how to connect the content pieces to the daily lives of young people. This is not something that is done easily with all of the areas of content, so spending specific time to focus on how students see themselves in the lesson is important, utilizing the 'Lesson Plan Outline' gives space to think through how to do this. Backwards planning also allows the educator to see if there are research projects that students have completed or are working on that might make them the expert during the lesson. Asking that student to lead the class, or lead alongside the educator, is another way that connections and support take place.

There are four points in the year where two weeks are set aside to make time for students to present their work, and complete presentations. During the first week students will meet with their teacher to complete their quarterly assessment. Also, in this time students will be asked to compile their best work (including experiments, content work as well as research and projects) to display in a binder to show during their conference.

Journals

Within the content days there are journals to begin every class, and those journals are not strictly science related, they are mostly personal journal prompts to help teachers see their students, and be able to link interests and experiences of students to future lessons. A list of possible journal prompts for each content section are listed below. Educators will answer each question to provide examples of sentence starters and proper grammar, and more importantly to show honesty and vulnerability to their students.

Conclusion

The purpose of this project is to develop a sense of belonging within a science curriculum for students. The way in which this is accomplished is through the creation of a curriculum that centers students as the creator. This is not a curriculum with step by step instructions on how to best fill your year, instead it is provided with full belief that educators will get to know their students in a way that makes creating lessons more relatable and engaging. This approach allows for a celebration of their findings as something worth sharing. As students become the expert in their area of study, they will see themselves as necessary to the space, and incredibly knowledgeable. These feelings are avenues to a sense of belonging, not only in the classroom or curriculum, but to education as a whole.

2021-2022 Calendar Outline

NO SCHOOL	RESEARCH	CONTENT	EXPERIMENTS	CATCH-UP DAY/ PROJECT PREP/ PRESENTATION

September	Monday	Tues	Wed	Thurs	Fri
			1	2	3
	6	7	8	9	10
	13	14	15	16	17
	20	21	22	23	24
	27	28	29	30	

October	Monday	Tues	Wed	Thurs	Fri
					1
	4	5	6	7	8
	11	12	13	14	15
	18	19	20	21	22
	25	26	27	28	29

November	Monday	Tues	Wed	Thurs	Fri
	1	2	3	4	5
	8	9	10	11	12
	15	16	17	18	19
	22	23	24	25	26
	29	30			

December	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
			1	2	3
	6	7	8	9	10
	13	14	15	16	17
	20	21	22	23	24
	27	28	29	30	31

January	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
	3	4	5	6	7
	10	11	12	13	14
	17	18	19	20	21
	24	25	26	27	28
	31				

February	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
		1	2	3	4
	7	8	9	10	11
	14	15	16	17	18
	21	22	23	24	25
	28				

March	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
		1	2	3	4
	7	8	9	10	11
	14	15	16	17	18
	21	22	23	24	25
	28	29	30	31	

April	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
					1
	4	5	6	7	8
	11	12	13	14	15
	18	19	20	21	22
	25	26	27	28	29

May	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
	2	3	4	5	6
	9	10	11	12	13
	16	17	18	19	20
	23	24	25	26	27
	30	31			

June	<i>Monday</i>	<i>Tues</i>	<i>Wed</i>	<i>Thurs</i>	<i>Fri</i>
			1	2	3
	6	7	8		

Note: The 2 yellow days (one in December, one in June) are free days, and are set aside for completely non-academic days at the school

Possible Content Layout

Month	Research	Content
Sept	Weeks 1-3	Intros Creating the class question Claim-Evidence-Reasoning Scale in the Solar System
Oct	Weeks 4-6	Sun-Earth System
Nov	Weeks 7-9	Rock Cycle & Earth's History
Dec	Weeks 10-12	Rock Cycle & Earth's History
Jan	Week 13	Plate Tectonics
Feb	Week 14&15 Week 16&17	Plate Tectonics Earthquakes & Volcanoes
March	Week 18 Week 19	Earthquakes & Volcanoes
Apr	Week 20-21 Week 22&23	Weather/Climate change
May	Week 24-27	Renewable resources
June		

These are the topics that could be covered and possibly incorporate your students work, or the topics can be entirely thrown out for any ideas that you have, or that your students are feeling passionate about learning.

Possible Journal Prompts

- **Intros (1 week)**
 - Name a time when you didn't perform at your best. How did you feel? What would you do differently if you had another chance?
- **Creating the class question (1 week)**
 - What does it mean to be 'inclusive'? How can we make sure we are doing that?
- **Claim - Evidence - Reasoning (1 week)**
 - Has anyone ever told you something without being able to prove it? How did you feel when that happened?
- **Scale in the Solar System (1 week)**
 - What does it mean when someone says "You're making this bigger than it needs to be"?
- **Sun-Earth System (2 weeks)**
 - What is something personal that you don't think you could live without (besides food and water and air). Why?
 - Who is one person in your life that you feel gives you the most support, and how do they show that?
- **Rock Cycle & Earth's History (4 weeks)**
 - If you had to break your life up into three separate pieces, where would you split it? Why?
 - If you had been around since Earth came into existence, what are three things you would have wanted to see?
 - What has been the most important part of your history so far? Why?
 - What is something you want to add to your daily routine? Why?
- **Plate Tectonics (4 weeks)**
 - People say "life is a puzzle" what does that mean?
 - What is a time where you felt like you were under a lot of pressure?
 - Sometimes we have to wait a longtime for something to happen. Name a time when you have to wait awhile for something to happen, how did you stay patient in that time?
 - If someone says the phrase "This is bigger than us" what does that mean to you?
- **Earthquakes & Volcanoes (4 weeks)**
 - Sometimes people talk about an event in their life "shaking it up" what does that mean? What is an event that you feel shook up your life?
 - When is a time where you felt like you were going to "Blow up" at someone? What are some healthy ways we can work through those feelings?

- If you could throw something into a volcano, so you would never have to see it again, what would it be? Why?
- If there was an Earthquake, what are the three things you would grab first to keep them from getting destroyed? Why?
- **Weather/Climate change (4 weeks)**
 - If you could keep something from changing would you try and stop it, or would you prepare for what is coming? Why?
 - If you could control any part of the weather, which part would you control and why?
 - If you had to live in a place that was always hot, or always cold, which would you choose? Why?
 - Change is always happening, what is something new that you have had to adjust to in your life? Was it easy or hard?
- **Renewable resources (4 weeks)**
 - If you could have an endless supply of something, what would it be? Why?
 - What is something you feel that you run out of all the time? What is one thing you can do to keep that from happening?
 - If the world is running out of certain items, why do we keep using them?
 - You have two ways to make a lot of money, which do you choose and why?
 - 1 - do you sell something that is going to run out eventually at a very high price
 - 2 - or do you spend money creating something new that will eventually make money, and never run out

Lesson Plan/Lab Outline

Topic Being Covered:

Time needed:

Directions/Instructions:

How will the subject matter be connected to everyday experiences?

Student interests that will be included:

Student's Research that will be incorporated:

How will it be incorporated?

Materials Needed:

Desired Lesson Outcome:

Lesson Plan Example

Topic Being Covered: Beginning of the School Year Introductions/ “Guess Who” game

Time needed: One day of Content

Directions/Instructions: [Tutorial Video](#)

How will the subject matter be connected to everyday experiences? Subject matter will be connected to everyday experiences through students creating their own “Guess Who” slide. All descriptions of themselves and interest are entirely their own and up to them to choose. This allows students to see themselves and to incorporate their everyday interests

Student interests that will be included: The game is entirely student driven, so everything discussed and created is by them and for them.

Student’s Research that will be incorporated: We have not yet started research so they won’t necessarily be sharing any research, except for what their interests are and any research they’ve done surrounding them outside of school and in their daily life

How will it be incorporated? Through the slides, via pictures and/or words

Materials Needed:
Every student will use their chromebook to create a Google Slide

Desired Lesson Outcome:
Students will learn common interests between themselves and their peers that they may not have already known. Also it provides a way for new students to find other students that they have shared interests with

Lab Outline Example

Topic Being Covered: The Importance of Failure

Time needed: One day of Lab

Directions/Instructions: [Bridge Lab PPT](#)

How will the subject matter be connected to everyday experiences? Failure can be a challenging roadblock for a lot of students, so highlighting how people they celebrate have failed can make it seem a little less daunting. Understanding that success comes with understanding our failures can be an important first step in the world of science, and this can be a great spot to reflect on at any point in the year.

Student interests that will be included: Using students' interest in celebrities and athletes draws them into the slide show, and the competition during the actual lab is something that they enjoy. Educators should make sure to rotate the celebrities and athletes periodically as people who are famous one year might not be famous the next.

Student's Research that will be incorporated: We have not yet started research so they won't necessarily be sharing any research, except for what their interests are and any research they've done surrounding them outside of school and in their daily life

How will it be incorporated? Students who have a high retention for celebrity or athlete information, or are big into construction will be able to show what they know in this lab.

Materials Needed:

Paper Binders
Clothes Pins
Popsicle Sticks
Hand Weights or heavy materials to place on built bridges
[Lab Handout](#)

Desired Lesson Outcome:

Students understand the necessity of failure and what it can lead to, and how we can learn from it.

Resources

Utilize these ‘Labs & Content’ resources to find jumping off points for lessons and labs, all the while holding student consideration when finalizing and tweaking what everything is going to look like.

Labs & Content

<https://middleschoolscience.com/earth-science/>

<https://teachearthscience.org/>

<https://www.earthsciweek.org/classroom-activities>

<https://sciencespot.net/Pages/classearthlsn.html>

<https://www.jpl.nasa.gov/edu/teach/tag/search/Earth+Science>

<https://geology.com/teacher/>

Use *Against Common Sense* if not having incredibly set lessons far in advance begins to feel challenging, and utilize *Understanding by Design* when you’re in the place of backwards planning from research topics and journal responses.

Against Common Sense: Teaching and Learning Toward Social Justice

by Kevin K. Kumashiro

Understanding by Design

by Grant Wiggins & Jay McTighe

Quarterly Student Check-In

Fill this portion out BEFORE YOUR MEETING

What are you most proud of in your research?

What are some things you want to improve upon next time?

What was something you did that surprised you so far this year?

What are some things you want to show off about your research?

Is there anything in school or outside of school that makes this project challenging?

DO NOT FILL THIS NEXT PART OUT UNTIL YOUR MEETING :)

Agreed upon goals for the next round of research

1.

2.

3.

Name: _____

RESEARCH

Weeks 1 - 3

All answers MUST be in complete sentences

Class Question:

Why did we choose this question?

Resources

1 YouTube Video:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

1 Article from online library:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

1 website:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

After your Research

What is your answer to our original question?

What helped you come to that conclusion?

Name: _____

RESEARCH

Weeks 4 - 6

All answers MUST be in complete sentences

Your Original Question:

Your New Question:

Why did you choose this new question?

Resources (Must all be different than your original 3)

1 YouTube Video:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

1 Article from online library:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

1 website:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

After your Research

What is your answer to your new question?

What helped you come to that conclusion?

Name: _____

RESEARCH

Weeks 7 - 9

All answers MUST be in complete sentences

Your question from weeks 4-6:

Your New Question:

Why did you choose this new question?

Resources

2 YouTube Videos

Video 1 :

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

Video 2 :

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

2 Articles from online library

Article 1 :

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

Article 2 :

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

2 websites

Website 1:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

Website 2:

- One thing you already knew:

- One thing you learned:

- One question you have after reading/watching/listening:

After your Research

What is your answer to your question?

What helped you come to that conclusion?

Name: _____

RESEARCH
Weeks 10 - 12

All answers MUST be in complete sentences

Your question from weeks 7-9:

Your New Question:

Why did you choose this new question?

Resources

2 YouTube Videos

Video 1 :

- Two things you already knew:

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○

- Two things you learned:

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-

- One question you have after reading/watching/listening:

Video 2 :

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

2 Articles from online library

Article 1 :

- Two things you already knew:

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○

- Two things you learned:

○

○

- One question you have after reading/watching/listening:

Article 2 :

- Two things you already knew:

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○

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

2 websites

Website 1:

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

Website 2:

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

After your Research

What is your answer to your question?

What helped you come to that conclusion?

Name: _____

RESEARCH
Weeks 13 - 15

All answers MUST be in complete sentences

Your question from weeks 10-12:

Your New Question:

Why did you choose this new question?

Resources

2 YouTube Videos

Video 1 :

Video 1 Summary (3-5 sentences):

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

Video 2 :

Video 2 Summary (3-5 sentences):

- Two things you already knew:

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- Two things you learned:

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- One question you have after reading/watching/listening:

2 Articles from online library

Article 1 :

Article 1 Summary (3 - 5 sentences):

- Two things you already knew:

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- Two things you learned:

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-

- One question you have after reading/watching/listening:

Article 2 :

Article 2 Summary (3 - 5 sentences):

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

2 websites

Website 1:

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

Website 2:

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

After your Research

What is your answer to your question?

What helped you come to that conclusion?

Name: _____

RESEARCH
Weeks 16 - 18

All answers MUST be in complete sentences

Your question from weeks 13-15:

Your New Question:

Why did you choose this new question?

Resources

2 YouTube Videos

Video 1 :

Video 1 Summary (3-5 sentences):

- Two things you already knew:

-

-

- Two things you learned:

-

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- One question you have after reading/watching/listening:

Video 2 :

Video 2 Summary (3-5 sentences):

- Two things you already knew:

-

○

- Two things you learned:

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○

- One question you have after reading/watching/listening:

2 Articles from online library

Article 1 :

Article 1 Summary (3 - 5 sentences):

- Two things you already knew:

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- Two things you learned:

-

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- One question you have after reading/watching/listening:

Article 2 :

Article 2 Summary (3 - 5 sentences):

- Two things you already knew:

-

-

- Two things you learned:

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- One question you have after reading/watching/listening:

2 websites

Website 1:

- Two things you already knew:

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- Two things you learned:

○

○

- One question you have after reading/watching/listening:

Website 2:

- Two things you already knew:

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-

- Two things you learned:

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-

- One question you have after reading/watching/listening:

After your Research

What is your answer to your question?

What helped you come to that conclusion?

Name: _____

RESEARCH

Weeks 19 - 21

All answers MUST be in complete sentences

Your question from weeks 16-18

Your New Question:

Why did you choose this new question?

Resources

3 YouTube Videos

Video 1 :

Video 1 Summary (3-5 sentences):

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

Video 2 :

Video 2 Summary (3-5 sentences):

- Two things you already knew:

-

○

- Two things you learned:

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- One question you have after reading/watching/listening:

Video 3 :

Video 3 Summary (3-5 sentences):

- Two things you already knew:

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○

- Two things you learned:

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○

- One question you have after reading/watching/listening:

3 Articles from online library

Article 1 :

Article 1 Summary (3 - 5 sentences):

- Two things you already knew:

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- Two things you learned:

○

○

- One question you have after reading/watching/listening:

Article 2 :

Article 2 Summary (3 - 5 sentences):

- Two things you already knew:

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- Two things you learned:

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○

- One question you have after reading/watching/listening:

Article 3 :

Article 3 Summary (3 - 5 sentences):

- Two things you already knew:

-

-

- Two things you learned:

-

-

- One question you have after reading/watching/listening:

3 websites

Website 1:

- Two things you already knew:

○

○

- Two things you learned:

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○

- One question you have after reading/watching/listening:

Website 2:

- Two things you already knew:

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○

● Two things you learned:

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○

● One question you have after reading/watching/listening:

Website 3:

● Two things you already knew:

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● Two things you learned:

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- One question you have after reading/watching/listening:

After your Research

What is your answer to your question?

What helped you come to that conclusion?

Name: _____

RESEARCH
Weeks 22 - 26

All answers MUST be in complete sentences

Your question from weeks 19-21

Your New Question:

Why did you choose this new question?

Resources

3 YouTube Videos

Video 1 :

Video 1 Summary (3-5 sentences):

- Three things you already knew:

-

-

-

- Three things you learned:

-

-

-

- One question you have after reading/watching/listening:

Video 2 :

Video 2 Summary (3-5 sentences):

- Three things you already knew:

-

-

-

- Three things you learned:

-

-

-

- One question you have after reading/watching/listening:

Video 3 :

Video 3 Summary (3-5 sentences):

● Three things you already knew:

○

○

○

● Three things you learned:

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○

- One question you have after reading/watching/listening:

3 Articles from online library

Article 1 :

Article 1 Summary (3 - 5 sentences):

- Three things you already knew:

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○

- Three things you learned:

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- One question you have after reading/watching/listening:

Article 2 :

Article 2 Summary (3 - 5 sentences):

- Three things you already knew:

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- Three things you learned:

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- One question you have after reading/watching/listening:

Article 3 :

Article 3 Summary (3 - 5 sentences):

- Three things you already knew:

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- Three things you learned:

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- One question you have after reading/watching/listening:

3 websites

Website 1:

- Three things you already knew:

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- Three things you learned:

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- One question you have after reading/watching/listening:

Website 2:

- Three things you already knew:

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- Three things you learned:

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- One question you have after reading/watching/listening:

Website 3:

- Three things you already knew:

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- Three things you learned:

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- One question you have after reading/watching/listening:

After your Research

What is your answer to your question?

What helped you come to that conclusion?

