Get Jiggy with Geocache

Daniel Keegan

Upper Elementary and Middle Grade students

July 26, 2018

NOT ALL WHO WANDER ARE LOST.

Rationale

Why are the skills, content, and concepts presented in this unit important for students to learn?

How does exploration drive innovation? This is the essential question for the following unit designed to unpack the concepts of innovation and exploration. Understanding the ways in which innovation and exploration are related allow students to form meaningful cross curricular connections.

The skills students will develop in this unit are important because they provide the opportunities needed to analyze, organize, think critically, and be creative. Intra and inter personal skills will be strengthened as students will be required to work together to complete a performance task. Challenging tasks often allow for reflective practice which will help students develop ways to engage with difficult life situations. Students will observe and listen in order to form and to answer higher order thinking questions. Data will be interpreted to inform thoughtful analysis. Students will have the opportunity to practice visual, oral, and written communication modalities.

The content covered in this unit provides students ways to engage with and understand technology, science, math, language, and art and the relationships between those fields and other domains. Much of the most profound and recent technological developments have happened in STEM fields; however exploration and innovation are not concepts limited to science, technology, engineering, and math. By exploring relevant technologies students will begin to understand how advances in STEM have impacted exploration and innovation in other fields of study and how advances in those fields of study have advanced exploration and innovation in STEM. The content of this unit will provide reason and rationale for the mastery of foundational skills while also providing opportunities for practice of those foundational skills across a wide variety of academic domains. This unit will help answer the students question, "Why does this learning matter? How is this learning relevant?"

The concepts discussed throughout the unit will connect learning to broad universal truths. Students will see how innovation in any area of human endeavor leads to exploration and how exploration leads to innovation. As students explore the concept they will find ways to connect their learning to these essential understandings and build on the meaning they have already constructed and in so doing create new learning opportunities. The power of a good essential understanding is in its ability to be known and discovered over and over again. As students become more familiar with the concepts of exploration and innovation

across a variety of domains they will begin to creatively explore and innovate on their own in new original ways.

Differentiation

What elements of this unit make it particularly beneficial or appropriate for gifted learners? (Be sure to discuss the dimensions of differentiation: Content, Process, Product, and Learning Environment AND the features of differentiation: Complexity, Challenge, Depth, Creativity, and Acceleration)

This unit is particularly beneficial for gifted learners because it can be adapted to meet learners needs by readiness, interest, or learning profile. The unit is mostly differentiated by process; the way in which learning is sequenced by the teacher and learned by the student. Four different models for instruction are used in the unit: Taba, Bruner, Creative Problem Solving, and Visual Thinking Strategies. Content differentiation in the unit is mostly modified to meet the needs of each model. For example, the content students explore during the Bruner lesson has been modified to model the content a field botanist would use or encounter. This specifically impacted the vocabulary used for this lesson. This unit requires students to be able to read and understand text at an 8th grade level - a significant content modification to consider especially if the unit is to be used with younger students. Product differentiation/modification is evident throughout the Creative Problem Solving lesson. The level of complexity can be increased or decreased by creating limitations on the geocache containers (for example - limiting materials used or presenting a scenario in which a container may need to be modified for a specific purpose) or exploring a reason why some municipalities do not allow geocache containers. In the current lesson students are not allowed to use glue to create their containers and have been limited in the size of the container while maintaining specific container requirements. The learning environment has been differentiated in this unit in that it requires students to go outside on multiple occasions to collect specimens and place geocache containers. Students must consider how this real world environment might impact their approach to the performance task.

The complexity of this unit is unlimited in its capacity to be differentiated in that the essential question can be connected across all disciplines. Specifically complexity is demonstrated in the Taba/Questioning lesson as students explore multiple resources and then apply what they learn from those resources to create a generalization and draw conclusions guided by higher order thinking questions.

Challenge differentiation is seen in the Bruner/Taba lesson in that effective implementation requires very specific and sophisticated content. During the Visual Thinking Strategies lesson challenge is increased as cross disciplinary application of ideas begin to challenge the student to see the essential understanding as something that can be explored across subject

matter.

Depth differentiation is demonstrated in this unit's performance task. To effectively complete the performance task students will need to have studied the concept in multiple applications and develop a product with rationale that supports the essential understanding.

Creativity differentiation is limited. Growth in this area of differentiation for the unit should be considered and implemented. Creativity differentiation is demonstrated briefly in the Creative Problem Solving lesson as each group decides how to design their geocache marker to meet specific challenges. The open ended questions of the Visual Thinking Strategies lesson also touches the creativity component of differentiation. Students choice in choosing team names and designing team logos adds to this dimension of differentiation.

Acceleration is a component of differentiation that is missing from this unit. Providing a "pre knowledge" assessment before unit implementation would provide data that might be helpful in designing opportunities for acceleration. Teachers should reflect on pacing and how it effects student performance throughout the unit. Acceleration as an effective differentiation method may become necessary if students quickly grasp and answer the higher order thinking questions in each lesson without much effort. If possible, teachers should provide opportunities for students who know content to by-pass assignments that would only serve to function as "busy work". Compacting lesson content would provide opportunities for some students to spend more time on specific parts of the performance task.

Goals and Outcomes

Content Goal

To develop understanding of important navigation innovations throughout history and how those innovations have impacted modern GPS technology

Outcomes

Students will be able to...

1. Know the historical context of and identify the characteristics and attributes of major past and present navigational innovations and how they relate to GPS technology
2. Compare and contrast modern GPS technological approaches to navigational problem solving to past technological approaches to navigational problem solving
3. Predict how current technological innovations may impact future GPS technologies
4. Field test and revise GPS instruments

Process Goal

To develop the ability to analyze relationships and examine cause and effect between past and present innovations

Process Outcomes

Students will be able to...

1. Formulate questions in response to a posed problem
2. Develop reasonable hypotheses based on relevant information
3. Determine benefits and drawbacks of technological innovations
4. Understand the importance of cooperation and collaboration for innovative processes
5. Predict outcomes based on evidence

Concept Goal

To understand the concept of innovation and its inter-relatedness to exploration

Concept Outcomes

Students will be able to...

1. Use principles of innovation to creatively problem solve
2. Analyze problems using innovative thinking processes
3. Draw conclusions and make generalizations about the relationship between innovation and exploration
4. Make inferences about current innovations and their impact on different aspects of humanity/environment
5. Transfer knowledge of innovation to all domains of endeavor

Assessment Plan

What evidence will show that students understand? Describe formative assessments and summative assessment (performance task) that will be used to monitor student progress in meeting established goals throughout unit. Include student work samples (copies and/or photos) that demonstrate student content knowledge, skill development, and understanding of the unit's concept.

Formative Assessments

The formative assessments for this unit provide feedback to assess students understanding of content knowledge and provided opportunities for facilitators to check in with students on their reflective understanding of the essential question of the unit. Exit ticket reflections are themed to lesson focus and essential question. Content quizzes bring focus to specific content covered by the lesson and provide feedback to adjust for knowledge gaps important for concept development. Both formative assessment strategies aid in lesson differentiation as the unit progresses.

Summative Assessment

The performance task for this unit builds on the content and concepts covered in the units lessons. Each lesson provides learning opportunities aligned to unit goals and outcomes that will assist in the completion of the performance task. In this performance task students will need to articulate an answer to the essential question of the unit - How does exploration drive innovation? Demonstrate knowledge of modern GPS technology, collaborate with a small group to create a comprehensive and thorough presentation, and analyze relationships between past and present innovations. Specific directions for the performance task can be found at the link below:

Jungle Explorers Performance Task

https://docs.google.com/document/d/1HJFSJym2IFqYMQsVrhSr42c4Ma2E414_4ixyMj8Tsrs/edit?usp=sharing

The rubric used to assess the performance task can be accessed by the link below:

Rubric

https://photos.app.goo.gl/7vgGTPZtNnmCweuG9

Student Work Samples

Below are links to student work samples from the unit:

Materials for Geocache containers: https://photos.app.goo.gl/XWZ9Hfuuij2zfgYj8

Taba Groupings: https://photos.app.goo.gl/643nLnC48fmmwTaA9

Geocache Team Logos: https://photos.app.goo.gl/6ZCutFrz9EM5xsCw8

Plant Observations - Field Botanist (Bruner Model): https://photos.app.goo.gl/NNxwgwJaUAb13r4E9

Exploration and innovation in poetry - illustrations used to convey meaning of "Poem" by Langston Hughes: https://photos.app.goo.gl/LydsYTQRFHy1AZt9A

TEACHER NAME
Daniel Keegan

GRADE LEVEL
3-5

NC CURRICULUM STANDARDS

3.E.2 Compare the structures of the Earth's surface using models or three-dimensional diagrams.

3.SI.1 Categorize sources of information for specific purposes.

3.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.

4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes.

3.G.1 Understand the earth's patterns by using the 5 themes of geography: (location, place, human environment interaction, movement and regions).

Solve problems involving measurement.

NC.3.MD.2 Solve problems involving customary measurement

Represent and interpret data.

NC.3.MD.3 Represent and interpret scaled picture and bar graphs

Understand decimal notation for fractions, and compare decimal fractions

NC.4.NF.7 Compare two decimals to hundredths by reasoning about their size using area and length models, and recording the results of comparisons with the symbols >, =, or <. Recognize that comparisons are valid only when the two decimals refer to the same whole.

Solve problems involving measurement

NC.4.MD.1 Know relative sizes of measurement units. Solve problems involving metric measurement

NC.4.MD.2 Use multiplicative reasoning to convert metric measurements from a larger unit to a smaller unit using place value understanding, two-column tables, and length models.

Represent and interpret data

NC.4.MD.4 Represent and interpret data using whole numbers

Classify shapes based on lines and angles in two-dimensional figures

NC.4.G.1 Draw and identify points, lines, line segments, rays, angles, and perpendicular and parallel lines.

Analyze patterns and relationships

NC.5.OA.3 Generate two numerical patterns using two given rules.

Understand the place value system

NC.5.NBT.1 Explain the patterns in the place value system from one million to the thousandths place.

NC.5.NBT.3 Read, write, and compare decimals to thousandths.

Convert like measurement units within a given measurement system

NC.5.MD.1 Given a conversion chart, use multiplicative reasoning to solve one-step conversion problems within a given measurement system.

Represent and interpret data

NC.5.MD.2 Represent and interpret data.

Understand the coordinate plane

NC.5.G.1 Graph points in the first quadrant of a coordinate plane, and identify and interpret the x and y coordinates to solve problems.

CCR Anchor Standard R.7 – Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words

CCR Anchor Standard R.10 – Read and understand complex literary and informational texts independently and proficiently, connecting prior knowledge and experiences to text

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3.G.1 Understand the earth's patterns by using the 5 themes of geography: (location, place, human environment interaction, movement and regions).

3.SI.1 Categorize sources of information for specific purposes.

4.G.1 Understand how human, environmental and technological factors affect the growth and development of North Carolina.

5.G.1 Understand how human activity has and continues to shape the United States.

CCR Anchor Standard R.10 – Read and understand complex literary and informational texts independently and proficiently, connecting prior knowledge and experiences to text

CONCEPT
Innovation

ESSENTIAL UNDERSTANDING
Exploration drives innovation

ESSENTIAL QUESTION
How does exploration drive innovation?

CRITICAL CONTENT - Students will know that...

the definition of a grid

- a network of regularly spaced lines on a map that cross one another at right angles and are numbered to enable the precise location of a place.

the basic parts of a coordinate plane grid

- A coordinate plane has one horizontal axis, the x-axis and one vertical axis, the y-axis
- The x-axis and y-axis intersect at the origin. The origin is located at the ordered pair (0,0)
- The coordinate plane is divided into four quadrants. Quadrant one (QI) is the top right fourth of the coordinate plane, where there are only positive coordinates.

the definition of longitudinal lines

- **Lines** of **longitude**, or meridians, run between the North and South Poles. They measure east-west position. The prime meridian is assigned the value of 0 degrees, and runs through Greenwich, England.

the definition of latitudinal lines

- **Lines** of **latitude** measure north-south position between the poles. The equator is **defined** as 0 degrees, the North Pole is 90 degrees north, and the South Pole is 90 degrees south. **Lines** of **latitude** are all parallel to each other, thus they are often referred to as parallels.

the definition of equator

- an imaginary line drawn around the earth equally distant from both poles, dividing the earth into northern and southern hemispheres and constituting the parallel of latitude 0°.

the definition of prime meridian

- the earth's zero of longitude, which by convention passes through Greenwich, England.

the definition of international date line

- The **International Date Line**, established in 1884, passes through the mid-Pacific Ocean and roughly follows a 180 degrees longitude north-south **line** on the Earth. It is located halfway round the world from the prime meridian—the zero degrees longitude established in Greenwich, England, in 1852.

how many seconds in a minute

- 60

how many minutes in a degree

- 60

the definition of accuracy

- the degree to which the result of a measurement, calculation, or specification conforms to the correct value or a standard.

the definition of precision

- refinement in a measurement, calculation, or specification, especially as represented by the number of digits

given.

how many degrees from equator to pole

- 90 degrees

how many degrees from prime meridian to international date line

- 180 degrees

division of earth into hemispheres

- Western
- Eastern
- Southern
- Northern

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the definition of a satellite

- A satellite is a moon, planet or machine that orbits a planet or star.

examples of satellites

- Earth and the moon are examples of natural satellites.
- Thousands of artificial, or man-made, satellites orbit Earth.

functions of a satellite

- take pictures
- predict and track weather
- help scientists better understand the solar system and universe
- communication
- Global Positioning System

the parts of a satellite

- antenna
- a power source
  - battery
  - solar panel
- camera
- sensors

the names of satellite orbits

- geostationary
- polar

the name and year of the first satellite put into orbit

- Sputnik 1 was the first satellite in space. The Soviet Union launched it in 1957.

the name and year of the first satellite the U.S. put into orbit

- Explorer 1 satellite in 1958. Explorer 1 was America's first man-made satellite

the name and year of the first satellite to take a picture of the earth from orbit

- The first satellite picture of Earth came from NASA's Explorer 6 in 1959

the name and year of the first satellite to broadcast a TV signal from orbit

- TIROS-1 followed in 1960 with the first TV picture of Earth from space

PROCESS SKILLS - Students will be able to...

solve problems involving measurement

Convert like measurement units within a given measurement system

Represent and interpret data

Analyze to determine the coordinate plane

Create generalizations

Synthesis information

Identify and develop data gathering instruments and techniques

Make inferences

Utilize/demonstrate processes of collaboration and cooperation

Consider and evaluate multiple perspectives.

Develop hypotheses

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list items related to exploration

group listed items

give labels for defined groups

explain reasons for choices

regroup items or subsume individual items or whole groups

synthesize information by summarizing the data and forming generalizations

MATERIALS

Grid paper - large square to small square grid paper

Small fun items to attach to grid paper (about the size of a penny or smaller)

Tape/Adhesive/Poster putty

Globe

Standard rulers

Writing utensils

https://docs.google.com/document/d/1Dk6QQbiAdH3Y0Eh1lkX8NkgyCYWNHjm8hHS-4ZkM3LA/edit?usp=sharing - longitude and latitude

selection from: https://www.rmg.co.uk/discover/explore/prime-meridian-greenwich

https://www.rmg.co.uk/royal-observatory/history - Royal Observatory

https://docs.google.com/document/d/16s8AM8yrqCn1W4RPrTisqw93labdOHnbHRzQXdQ2B_E/edit?usp=sharing - history of Prime Meridian

selection from: https://www.rmg.co.uk/discover/explore/prime-meridian-greenwich

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Smart phone

Article from NASA - What is a Satellite?

https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html

Google Doc with text
- https://docs.google.com/document/d/1JY9ra24REUCfcgaCIOyldhP0AigJREvVwPYnG39U04E/edit?usp=sharing

White board

Sticky notes

Circle paper

Pen /Pencil/Marker

Candy

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question

What are the characteristics of an explorer?

How are you an explorer?

How are you innovative?

What images come to mind when you think of exploration?

What images come to mind when you think of innovation?

For what purpose do humans explore?

What innovations have aided human exploration? How would you compare and contrast these innovations?

In what ways have humans explored over time?

In what ways have innovations changed over time?

How has exploration driven innovation?

_____

What are some of the functions of a smart phone?

Of those functions, which ones do you think are the most important? Why?

How do these important functions work?

What kinds of technology are necessary for these important functions to operate?

Why were these technologies developed?

How have these technological innovations furthered exploration?

How would you define your location right now?

How precise is your definition?

How accurate is your definition?

What do you use to define location?

Why is location important?

How is location important to exploration?

How can we better determine location?

What strategies might help us better determine location? What tools may help us better determine location?

How would you create a way to determine location?

What kinds of innovations have helped determine location?

What math concepts or ideas connect to location?

How is measurement an important component of location?

Why is measurement important for exploration?

How is geometry an important component of location?

How does a coordinate plane incorporate geometry and measurement?

How is a coordinate plane innovative?

In what ways can a grid be modified to provide more accurate and precise location?

What challenges would explorers from the past have faced without precise location measurements?

How do challenges inspire innovation?

How has understanding longitude and latitude helped further exploration?

In what ways has exploration benefited societies? In what ways has exploration not benefited societies?

In what ways have innovations benefited society? In what ways has innovation not benefited society?

What would be the result of having no agreed upon location for the prime meridian?

What is the significance of the prime meridian being located over Greenwich, England?

How do the ideas of innovation and exploration relate to the significance of the prime meridian being located over Greenwich, England?

How are latitude and longitude systems the result of exploration?

How are latitude and longitude innovative?

How have innovative thoughts/ideas driven exploration?

How does exploration drive innovation?

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How would life on earth be

How has exploration shaped innovation?	How could you apply a grid to a surface that is not flat? How would applying a grid to a sphere effect the grid? In what ways has exploration lead to innovative measuring/locating techniques? _____ What are the benefits of a satellite? What are the drawbacks of a satellite? Why were satellites developed? What kinds of problems do satellites help solve? How have satellites helped humans understand the earth? How have satellites helped humans understand space? This article was published by NASA. What is NASA?	different without satellites? Why or why not is the International Space Station a satellite? What is the purpose of the International Space Station? What motivates exploration? What types of problems do explorers encounter? What role does innovation play in explorers solving the types of problems they may encounter? How does exploration drive innovation?

PLANNED LEARNING EXPERIENCES

Engage and Connect:

Explore each other - characteristics - ice breaker game - Can you crack the code?

Teacher models an image from the image library and explains how it connects to exploration. Students are asked to choose an image from an image library that represents exploration and share with an assigned partner how the image relates to the idea of exploration.

Explore:

Students are assigned into teams of two. Two teams are set up facing each other. Each team is allowed to set up a work space and examine the sheets of paper passed out by the teacher. The teacher explains that every group has been given the same paper (2 copies). Each group records their observations of the paper and describe what is on the paper. Each group is then asked to select a few items from a table and affix their items to one of the sheets of paper using poster putty. They are told not to let another group see the location of their items on their paper and to put up a folder to prevent other teams from seeing their items. Teams are told they are about to play a game similar to battleship. Each team will try to locate the other team's items by describing the location they think is accurate to the items. If they are correct they get a point. If they are incorrect they do not get a point.

Have students play the game for a little bit. Explain that the other paper will be used to record areas that their team has already "searched" It will be extremely difficult this first round. Students will describe locations in relation to objects printed on paper. They will describe direction and measurement in a variety of ways. Stop game before frustration point. Tell students that you will pass two additional sheets of paper to each group. This time sheets will have large square grids. Explain that if a team selects a grid that has a team's item inside of it they must notify the opposing team and let them know. Then the team that has selected a correct grid gets one additional turn to narrow down the location of the item within the grid. What they use to describe where they think the item is within the square grid is up to them.

After some time the teacher will stop this round of the game and pass out one more round of papers. This time the papers will be set up much like a battleship grid. Students will place their items on their new grids and continue play. After an amount of time play is stopped.

Explain:

Kaplan's Icon: Complexity with Over Time - Content/questioning helps explain how or why things changed or remained the same.

Teacher asks During Lesson questions 1-7 above. Students are encouraged to answer questions in whole group and develop their own questions

Elaborate:

Kaplan's Icon: Complexity with Across Disciplines - Content/questioning unpacks the topics place in

more then one discipline or subject area.

Students will read a text about latitude and longitude in small groups. Students will be asked to look for key terms from Critical Content above. Teacher asks During Lesson questions 8-14 above. Answers to questions are discussed in whole group.

Teacher explains to students that they will work in pairs to use what they have learned to create clues and longitude and latitude coordinates to create a riddle for another team to solve. Show how latitude and longitude appear on maps and globes.

As students work and finish task **teacher assigns article about the history of the prime meridian** then asks Post Lesson questions to the whole group and facilitates discussion celebrating student pairs that locate landmark. Particular focus should be paid attention to understanding the significance of Greenwich, England being the location of the prime meridian and the landmark there which the prime meridian passes through.

Evaluate:

Kaplan's Icon: Depth with Big Idea - Content/questioning leads to a general statement that summarizes information and draws a conclusion based on evidence drawn from a collection of facts or ideas.

Teacher asks students to develop one good question they would ask an explorer - either of the past or present - and to write it down on one side of a note card. Students may share if they would like to.

Teacher instructs students to flip over note card and respond to the essential question: How does exploration lead to innovation?

Hook

Youtube video funny GPS: https://www.youtube.com/watch?v=EsGZ1ghytzM

Ask at least two Pre Lesson questions above. Lead students to consider how satellite technology is crucial to modern day life.

Introduce article from NASA about satellites. Have students read through article individually.

Listing

Introduce concept and essential question. Have students list items related to concept from the article. How is the idea of exploration incorporated into this article about satellites? List words and/or phrases which you find in the article that are related to exploration and its possible relationship to innovation. List may include some of the following:

bird's eye view of earth, quick data collection, space exploration, communication to different parts of earth, cameras and scientific sensors, information about land, air and water, solar system and universe, geostationary orbit, polar orbit, scan the globe, Sputnik, high energy particles cosmic rays, clouds, oceans, ice, gas in the atmosphere, Earth energy input and output, wildfires, volcanoes,

weather, disease, famine, climate, agriculture, emergency response, dangerous rays, asteroids, comets, history of stars, origin of planets, other planets, evidence of life, GPS,

Ask two During Lesson questions above.

As a group students select the 20 with which they wish to work.

Move students into pre assigned groups of three to discuss concept.

Grouping

Instruct students in small groups to think about how they would group items together. Students group listed items together. Students can write listed items onto circle papers available for each group. Ask one During Lesson question above for small group discussion and consideration.

Labeling

Challenge students in assigned small groups to develop four categories of listed items. Discuss groupings as large group. List groups on board. Ask one During Lesson question above for small group discussion and consideration.

Regrouping

Have student groups reduce their four categories to three categories and create new labels for each category. Ask one During Lesson question above for small group discussion and consideration.

Synthesizing

As a large group discuss how all this information could be summarized under the concept of Exploration. What could be said about all of these groups as it relates to exploration? Write summary statement on white board.

Conclusion

Discuss Post Lesson questions as a large group. Have students complete written statement as exit ticket answering essential understanding question. When students complete exit ticket they may participate in trivia game for prizes regarding information in text about satellites based off of critical content. Candy prizes for correct answers. Watch the following video:
https://www.youtube.com/watch?v=IoRQiNFzT0k

ASSESSMENTS

Students will correctly create clues and coordinates to identify two major landmarks on a map or globe by using latitude and longitude coordinates.

Students will develop their own question to ask an explorer from the past or present.

Students will answer the essential question, "How does exploration drive innovation?" on a note card as an exit ticket?

_____
_____

Written statement exit ticket answering essential understanding question.

Trivia game overview of critical content in article.

DIFFERENTIATION

CONTENT

Incorporating Kaplan's Icons.

Depth with Big Idea - Content leads to a general statement that summarizes information and draws a conclusion based on evidence drawn from a collection of facts or ideas.

Complexity with Over Time - Content helps explain how or why things changed or remained the same.

Complexity with Across Disciplines - Content unpacks the topics place in more then one discipline or subject area.

PROCESS

Use of the Questioning model - sequencing of higher order thinking questions to more fully develop the essential understanding and essential question. Purposeful questioning with consideration of student responses.

_____

Taba lesson format is appropriate for gifted students to develop and master thinking skills through guided inquiry.

PRODUCT

LEARNING ENVIRONMENT

ASSESSOR FIELD

Lesson Plan Revision

	Not Evident 0 points	**Developing** 1 points	**Proficient** 2 points
Conceptual Lens	No concept is identified	A concept(s) is identified that loosely connects to the content of the lesson.	A concept(s) is identified that strongly connects to the content of the lesson as demonstrated through a well-articulated essential understanding and essential question.
Alignment	There is no evident alignment of the Concept, Essential Understandings, Lesson Objectives, Activities, Guiding Questions, and Assessment.	There is some evidence of alignment among the Concept, Essential Understandings, Lesson Objectives, Activities, Guiding Questions, and Assessment.	There is strong alignment across all lesson elements: Concept, Essential Understandings, Lesson Objectives, Activities, Guiding Questions, and Assessment--all align.
Questioning	None of the planned questions will require high level thinking.	Few of the planned questions require high level thinking.	Planned questions require higher level thinking and engage students in rich discussions of the identified concept.
Assessment	The lesson does not include a formative assessment	The lesson assessment measures/assesses the lesson objectives	The lesson assessment measures/assesses the lesson objectives AND probes for a deeper level of student understanding.
Differentiation	No evidence of differentiation.	Appropriate methods of differentiation that address learning preference or interest are provided. Consideration of readiness level is not as clear OR more consideration needs to be given to either scaffolding or extensions.	Appropriate methods of differentiation that specifically address the readiness levels of students are provided. Careful consideration has been given to both scaffolding and extensions.

Total: 0 out of 10 points (0%)

TEACHER NAME
Daniel Keegan

GRADE LEVEL
3-5

NC CURRICULUM STANDARDS
3.E.2 Compare the structures of the Earth's surface using models or three-dimensional diagrams. 3.SI.1 Categorize sources of information for specific purposes. 3.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. 4.SI.1 Apply criteria to determine appropriate information resources for specific topics and purposes. 3.G.1 Understand the earth's patterns by using the 5 themes of geography: (location, place, human environment interaction, movement and regions). **Solve problems involving measurement.** NC.3.MD.2 Solve problems involving customary measurement **Represent and interpret data** NC.5.MD.2 Represent and interpret data. **CCR Anchor Standard R.7 – Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words** **CCR Anchor Standard R.10 – Read and understand complex literary and informational texts independently and proficiently, connecting prior knowledge and experiences to text** _____ 4.G.1 Understand how human, environmental and technological factors affect the growth and development of North Carolina. 5.G.1 Understand how human activity has and continues to shape the United States.

CONCEPT
Innovation

ESSENTIAL UNDERSTANDING
Exploration drives innovation

ESSENTIAL QUESTION
How does exploration drive innovation?

CRITICAL CONTENT - Students will know that...

Botany is - the scientific study of plants, including their physiology, structure, genetics, ecology, distribution, classification, and economic importance.

Taxonomy is - the branch of science concerned with classification, especially of organisms; systematics.

Botanists use taxonomy to further understand and explore the plant kingdom

There are six major divisions within the classification system: Kingdom, Phylum, Class, Order, Family and Genus

The classification system is not a perfect science - there is disagreement about how things should be organized - especially within botany

Classification divisions have specific suffixes to identify which division it belongs

Phylum - phyta

Class - opsida

Order - ales

Family - aceae

PROCESS SKILLS - Students will be able to...

Draw conclusions and make generalizations

Make inferences

Demonstrate effective cooperation and collaboration

Consider and evaluate multiple perspectives

Develop hypotheses

_____

synthesize information by summarizing observations/data and forming generalizations

use taxonomy to identify plants

Compare and contrast characteristics used to classify living things

Practice using data gathering techniques

MATERIALS

Laminate copies of Plant Kingdom taxonomy

Paper/pencil/clipboard to make observations

Copies of list of basic plant classifications endings by taxonomy

Link to article for students to read: https://docs.google.com/document/d/1nHF0gMauYZIzU2GibZ24k9tzMOCgLUJuu7VgjMR09Ac/edit?usp=sharing

Video (National Geographic field botanist): https://www.youtube.com/watch?v=WqPhTfaTock

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question
How are innovations tangible? How are innovations intangible? What are examples of intangible innovations? How do humans explore? How do humans explore ideas? What helps humans explore complex ideas/concepts? What intangible innovations help humans explore the world around them? What images come to mind when you think of exploration? What images come to mind when you think of innovation? For what purpose do humans explore? What innovations have aided human exploration? How would you compare and contrast these innovations? In what ways have humans explored over time? How does exploration drive innovation?	How is botany a response to exploration? How is taxonomy an innovation? How does taxonomy/classification further exploration? In what ways have innovations changed over time? How does exploration influence innovations?	Why has the classification system changed over time? How is the change in the classification system an example of innovation? Why is there no consensus on one classification system for plants? How might future exploration impact the classification system? How might changes in the classification system impact future exploration? How does innovation drive exploration?

PLANNED LEARNING EXPERIENCES

Hook

Students are given the poem "Poem" by Langston Hughes. They are tasked with performing the poem with their assigned group. After each group presents once a new restriction is placed on the group. They must present the same poem but do it this time using no words, only actions. After each group presents and additional restriction is placed on groups. They must present poem but for this final time they are only allowed to use illustrations. No words or actions.

Engage and Connect:

Students are asked to brainstorm a list of what they believe a botanist does.

Brainstorm seed dispersal - Gravity, Animals, Force, Wind, Water.... Students write down one thing they believe a field botanist does, disperse the "seed", and then add another idea to a "seed" they pick up.

After students have had the opportunity to brainstorm and list a variety of different ideas students will **watch one or two brief videos about what a botanist does**. Students will revisit their list of brainstormed ideas at the beginning of the lesson.

Students are put into performance task groups to go outside to determine a location and collect a plant from that location as part of the performance task. Students will make observations of plant and its surroundings/environment like a field botanist.

Student groups of field botanists will collect plant sample and return to classroom "lab" to organize their observations and to make additional observations. Student groups will organize their observations into four groups - name those groups then organize their observations into three groups - naming those groups. Groups will share their finding and how they organized and named their observations.

Student groups are asked to organize laminated cut outs of different plant "specimens" into groups to identify and develop labels for each group. Student groups must try to organize cut out "specimens" into seven groups with rationale for each group. After 5 minutes groups are invited to share the rationale behind how they grouped cut outs.

Ask pre lesson questions to group

Explore:

Students are introduced to the classification categories for plants - the main suffixes

Teacher explains the hierarchy of the categories - how each category is either more broad or more specific based on characteristic of the plant

Student performance task groups are tasked with developing a full classification of the plant they collected/"discovered" as field botanists. They are allowed to be creative in the pre fixes they choose however the pre fix must relate to characteristics of the plant within a hierarchy. The suffix will correlate to the correct classification category. Groups must be able to support how their

observations or characteristics of the plant connect to categories and prefix choice.

Explain and Extend:

Student groups are given Plant Kingdom classification. They may organize the cut outs according to the correct classification. Student groups infer the meaning of cellular and vascular based on the classification tree. Students may also work to infer the meaning of prefix tracheo - trachea - windpipe. Or bryo which means to swell or teem

Student groups share what they believe to be the meaning of words.

Teacher asks During Lesson questions above. Students are encouraged to answer questions in whole group and develop their own questions

Elaborate:

Students will read a text about the changing classification system. The article presents real challenges to the field of botany and the pros and cons to a changing classification system. Teacher asks end of lesson questions. Answers to questions are discussed in whole group.

Evaluate:

Students created classification of collected plant based on observations/characteristics with rationale for each classification name. On the back of created classification sheet students will give two suggestions based on the text they have read as to how they would change the plant classification system and how their suggestions might make the system better.

Exit ticket: name the six major divisions of taxonomy on one side of note card

Students to flip over note card and respond to the essential question: With consideration for the field of botany, how does exploration drive innovation?

ASSESSMENTS
Students will correctly name the six major divisions of taxonomy Students will develop their own complete classification of collected plant based on observations/characteristics Students will answer the essential question, "How does exploration drive innovation?" on a note card as an exit ticket?

DIFFERENTIATION

CONTENT

PROCESS
Use of the Bruner model - using real world classification techniques to creatively identify a living organism

PRODUCT

LEARNING ENVIRONMENT

TEACHER NAME
Daniel Keegan

GRADE LEVEL
3rd-5th

NC CURRICULUM STANDARDS
4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats. 5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time. 6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans. 7.E.1 Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans. 8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans

CONCEPT
Innovation

ESSENTIAL UNDERSTANDING
Exploration drives innovation

ESSENTIAL QUESTION
How does exploration drive innovation?

CRITICAL CONTENT - Students will know that...

Geocache markers/containers must be weatherproof

Different materials may be used to create geocache containers

A geocache container should contain a log for record keeping

Placement of a geocache marker should consider:

local law

permission of land owner

wise location

wise container

You are not allowed to bury a geocache - a geocache should be visible

PROCESS SKILLS - Students will be able to...

Determine cause and effect as it relates to geocache container placement

Make observations

Formulate questions

Make inferences

Ask appropriate questions

Evaluate a speaker's point of view

Accept the ideas of others

Work collaboratively

Brainstorm creative solutions

Use convergent and divergent thinking strategies

MATERIALS

Variety of materials that may be used to create a geocache container

Article for consideration and to be used in product differentiation as time allows: https://www.tucsonlocalmedia.com/news/article_cf55ed22-fe40-11e4-88a8-ebe32c144104.html

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question
What is geocaching? How is geocaching exploration? How has innovation impacted geocaching? How are the innovations that make geocaching possible related to exploration? How does exploration drive innovation?	How can you build an appropriate and effective geocache container using limited supplies? What requirements must be considered in creating a geocache container? How do these requirements help us understand the problems that should be considered in the process? What major obstacles will I confront? How do these obstacles relate to exploration? How do these obstacles relate to innovation? How might these obstacles be overcome? How do innovations help overcome obstacles related to exploration? What might go wrong? How can such problems be prevented?	What did your group do well? What would your group do differently? In what ways is a geocache container an innovation in response to exploration? How might exploration through geocaching impact future geocache container innovations? How might exploration in other fields of study influence future geocache container innovations? How does innovative thinking in geocache further exploration? How does exploration drive innovation? How does innovation drive exploration?

PLANNED LEARNING EXPERIENCES

Hook

Students are given an illustrated maze to explore. After a period of time students are allowed to collaborate. Short discussion on maze illustration and how the maze and illustration connects to ideas of exploration and innovation.

Engage

Students will be allowed to peruse materials that have been set out and suggest ideas as to what characteristics the items have in common

Explore

Students will be presented with the problem - they must build a geocache container with limited supplies.

Explain

Problem Finding

Students will be presented with the required components of their geocache container and how it will fit into their performance task. Geocache containers must:

contain a log for record keeping - in their case - a description of the plant in their performance task

be in compliance with local law - students will brainstorm implications of this requirement

(Brainstorming as a strategy will be discussed at this point - students will know that they should list as many ideas as possible without judgement)

have permission of land owner - students will brainstorm why this might be important

(Students will briefly reflect on brainstorming process)

consider a wise location - students will use divergent then convergent thinking in small groups to understand what problems make it important for teams to choose a wise location

(Convergent thinking is discussed as a strategy)

consider a wise container - students will use divergent then convergent thinking to understand what problems make it important for teams to choose a wise container

(Convergent thinking is reflected on as a process)

Idea Finding

Small groups will use divergent thinking to develop ideas/sketches of how they might build/create their geocache container. Small groups then use convergent thinking to choose four to six ideas that seem to have the greatest potential

Solution Finding

Small groups will develop criteria to evaluate their 4-6 ideas. Groups use divergent thinking to create a list of factors or criteria that will be used to evaluate ideas. Small groups use convergent thinking to narrow down ideas to 2-3

Acceptance Finding

Small groups will consider the following questions:

What major obstacles will I confront?

How might these obstacles be overcome?

What might go wrong?

How can such problems be prevented?

Small groups will use divergent thinking to list all responses to questions then use convergent thinking to determine what responses will help ensure success.

Elaborate

Student groups will use supplies to create geocache container

Evaluate

Successful completion of a geocache container that includes essential elements and is weatherproof using provided materials. Each group must provide a rationale for their design and why they believe it to be an effective design for its purpose. Student groups geocache containers may be tested by being placed underwater for a period of time....

Student groups reflect on the Creative Problem Solving Process.

Students will respond to the essential question through a written exit ticket response on a note card - how does exploration drive innovation?

ASSESSMENTS

Successful completion of a geocache container that includes essential elements and is weatherproof using provided materials. Each group must provide a rationale for their design and why they believe it to be an effective design for its purpose.

Students will respond to the essential question through a written exit ticket response on a note card - how does exploration drive innovation?

DIFFERENTIATION

CONTENT

PROCESS
Creative Problem Solving - students will attempt to create a geocache container with common household items

PRODUCT

LEARNING ENVIRONMENT

TEACHER NAME
Daniel Keegan

GRADE LEVEL
3-5

NC CURRICULUM STANDARDS
RL.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. RL.4.2 Determine a theme of a story, drama, or poem from details in the text; summarize the text. RL.4.3 Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text. RL.4.5 Explain major differences between poems, drama, and prose, and refer to the structural elements of poems and drama when writing or speaking about a text. RL.4.6 Compare and contrast the point of view from which different stories are narrated, including the difference between first- and third-person narrations. RL.4.7 Make connections between the text of a story or drama and a visual or oral presentation of the text, identifying where each version reflects specific descriptions and directions in the text. RL.4.9 Compare and contrast the use of similar themes and topics and patterns of events in stories, myths, and traditional literature from different cultures. RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area. RI.4.5 Describe the overall structure of events, ideas, concepts, or information in a text or part of a text RI.4.7 Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears. RI.4.8 Explain how an author uses reasons and evidence to support particular points in a text.

CONCEPT
Innovation

ESSENTIAL UNDERSTANDING
Exploration drives innovation

ESSENTIAL QUESTION
How does exploration drive innovation?

CRITICAL CONTENT - Students will know that...

Cartography is the science or practice of drawing maps

The difference between a map legend and map key

A legend is a more generic way to understand a map (for example - colors to distinguish different land features) whereas a map key is a way to understand specific symbols on a map

The definition of a map - a diagrammatic representation of an area of land or sea showing physical features, cities, roads, etc.

A geographer is an expert in the study of the physical features of the earth and its atmosphere, and of human activity as it affects and is affected by these

A flat map can never be 100% accurate

Scale refers to the proportionate display of objects on a map

Scale is displayed on maps in three ways

The graphic method

The verbal method

The fractional method

The advantages and disadvantages of a globe vs. a map

The difference between large scale and small scale

Map projection is representing a round earth on a flat surface

Different types of projections are

- Cylindrical
- Conic
- Plane
- Interrupted

Conformality - map which portrays shape accurately

Equivalency -map which portrays size accurately

Remote sensing technologies - technologies deployed from plane or satellite gather data to help create precise maps

Aerial photography - used to make accurate measurements through photogrammetry

Infrared sensing - can detect heat

Microwave sensing - detecting features beneath the earths surface

Radar sensing - radio signals that enable precise measurements

Sonar sensing - sound waves that enable precise measurements

https://kidsgeo.com/geography-for-kids/usefulness-of-maps/

PROCESS SKILLS - Students will be able to...

Use discussion, writing and visual art to explore ideas of cartography

Analyze visual content for concept development

Explore ideas using multiple means

Interpret perspectives

Use creative skills to express learning and understanding of concept

Demonstrate concept knowledge through authentic application.

MATERIALS

Paper, writing utensils, copies or projection of classical maps from Great Maps - The World's Masterpieces explored and explained - Entertainment for He Who Longs to Travel the World, Map of Venice, Piri Re'is Map, Map of Utopia, New France, Aztec Map of Tenochtitlan, white boards or cards with questions,

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question
How would you describe the kind of map you created? How did you decide what details you would include in your map? How did you decide what details not to include in your map? What does your map communicate about your understanding of your neighborhood? How does your map communicate about what you think is important in your neighborhood? In what ways is your map useful? What kinds of questions would your map help answer? How accurate is your map? How would you measure your maps accuracy? With what areas of your map are you most familiar? With what areas are you least familiar? How would exploration effect the accuracy of your map? What challenges may you face in exploring your neighborhood? What innovative ideas or solutions might you develop to meet those challenges? How does exploration drive innovation? How might innovation drive exploration?	What do you think is going on in this picture? What do you see that makes you say that? What else can you find in this picture? What do you think the purpose of this picture is? What kind of perspective is presented by this picture? What important ideas are communicated through this picture? What values are communicated through this picture? How do things not present in the picture help us understand the picture? How are symbols used in this picture? What feelings or impressions do have about this picture?	What time period is this picture from? Why do you say that? How does this pictures orientation inform its focus? What might be a primary purpose of this picture? Why do you say that? What big idea descriptive words come to mind when describing what is happening in this picture? In what ways does this picture connect with ideas of exploration? Why do you say that? How does this picture encourage exploration? Why do you say that? In what ways does this picture connect with ideas of innovation? Why do you say that? How is this picture innovative? Why do you say that? How does exploration drive innovation? How does innovation drive exploration?

PLANNED LEARNING EXPERIENCES

Hook

Students are given illustrations of common idioms and expressions. They are tasked with exploring the illustrations to understand the idiom and reflect on how language is innovative in how it conveys meanings. Group who decodes the most illustrated idioms wins!

Engage

Students are instructed to draw a map of their neighborhood based on their knowledge through exploration.

Teacher asks pre lesson questions while students are working on their map

Briefly discuss in what ways students have explored their neighborhoods. Connect neighborhood exploration to geography and its study. Define cartography and map. Talk about components of a map: Legend/Key, Cardinal directions

Discuss scale. Small groups decide if created maps are drawn to scale. Is scale important for these types of maps? What scale method might they use if they were to make another map of their neighborhood? Why?

Discuss

Globe vs. Map - examine globe and map - advantages/disadvantages

Map projections - examine different world map projections

Conformality and Equivalency

Remote sensing technologies

Explore

Teacher displays selected maps from DK Smithsonian Great Maps book

Teacher instructs students to observe the picture(s) silently

Explain

Teacher asks during lesson questions

Time is given for students to respond to each question and to comment or expand upon observations made by student peers

Students should note the time period of the picture, have an understanding of the symbols in the picture, compare the picture to a modern day picture of the area represented, understand the orientation of the picture, understand perspective and how it is shaped by a cartographer, discuss what map components are present/what map components are missing

Elaborate

Students are provided with cards/whiteboards with post lesson questions to present to the group

Prior to presentation to group each student responds to their question in writing.

Each student shares their response with the group - discussion facilitated by teacher to deepen understanding

Students read the following article about how laws impact Geocache and the implication of those laws on container design and placement of those containers and the kinds of problems that may need to be addressed by geocachers in the future: https://www.tucsonlocalmedia.com/news/article_cf55ed22-fe40-11e4-88a8-ebe32c144104.html

Evaluate

Teacher reviews post lesson questions - adds and clarifies any misunderstandings - fills in content knowledge as necessary to support student understanding - makes connections to previous readings and concept and implements assessment.

ASSESSMENTS

Students will create a map as part of their performance task. Students will be assessed based on the following using a rubric:

- Accuracy/Detail
- Creativity
- Usefulness considering the task
- Required components
    - Legend/Key
    - Orientation - cardinal directions
    - Title
- Quality/Effort

Students will respond to the question: How is your unique perspective reflected in the map of your neighborhood? How might your perspective impact future exploration of your neighborhood? (in order to develop the self knowledge facet of understanding.)

DIFFERENTIATION

CONTENT
Select ancient maps from *DK Smithsonian Great Maps: The world's masterpieces explored and explained*. Most students would have not had the opportunity to examine these ancient maps.

PROCESS
Visual Thinking Strategies model

PRODUCT

LEARNING ENVIRONMENT

Unit Resources

Provide a listing of books, Web sites, videos, and/or other instructional materials that are intended to supplement the unit. Include resources intended for both teacher and student use. Be sure to use APA style for books/articles and provide a brief (1-2 sentence) annotation for Web sites and instructional materials.

Globe - for teacher and student use

Maps - different projections - Buckminster Fuller's Dymaxion Map, Peters Projection Map, Rand McNally United States Signature Edition Albers Equal Area Projection Map

Scrap Exchange - Great store in Durham, NC area for finding parts to be used to create geocache containers/markers

Tablet/Phone with data access - Very important to have at least one device per group.

Geocaching App - Great app to introduce students to - especially if they are interested in geocaching outside of class and if they are interested in placing their own geocache container/marker. Basic features of this app are free but advanced features currently require a subscription

Google Maps App - a free app you can use to pinpoint specific latitude/longitude coordinates

Great Maps - The word's masterpieces explored and explained

Brotton, J. (2014).*Great maps*. NY, NY: DK Publishing.

Great City Maps - A historical journey through maps, plans, and paintings

Black, J. (2016).*Great city maps*. NY, NY: DK Publishing.

How GPS works video - https://www.youtube.com/watch?v=IoRQiNFzT0k

D. (2013, October 21). How GPS Works. Retrieved from https://www.youtube.com/watch?v=IoRQiNFzT0k

Funny GPS intro video - https://www.youtube.com/watch?v=EsGZ1ghytzM

C. (2013, July 25). The GPS Prank. Retrieved from https://www.youtube.com/watch?v=EsGZ1ghytzM

Extreme Mazes Book 2

Haussler, M. (2014).*Extreme Mazes Book 2*. MindWare Corporation.

Even More Word Winks

Zimmer, T. (2007).*Even more word winks: Over 300 visual verbal puzzles*. Roseville, MN: MindWare.

Link to Google Document "Poem" by Langston Hughes

- https://docs.google.com/document/d/17-4TMxmrNCotIJhL50MfI6meD_p-0R2D-IVD6JldWTE/edit?usp=sharing

Link to Google Document with selections about longitude and latitude - https://docs.google.com/document/d/1Dk6QQbiAdH3Y0Eh1lkX8NkgyCYWNHjm8hHS-4ZkM3LA/edit?usp=sharing - Longitude and latitude selections from: https://www.rmg.co.uk/discover/explore/prime-meridian-greenwich

What is the Prime Meridian and why is it in Greenwich? (2018, February 13). Retrieved from https://www.rmg.co.uk/discover/explore/prime-meridian-greenwich

Link to information about the Royal Observatory - https://www.rmg.co.uk/royal-observatory/history

History of the Royal Observatory. (2018, May 31). Retrieved from https://www.rmg.co.uk/royal-observatory/history

Link to Google Document with selections about the history of Prime Meridian - https://docs.google.com/document/d/16s8AM8yrqCn1W4RPrTisqw93labdOHnbHRzQXdQ2B_E/edit?usp=sharing

History of Prime Meridian selection from: https://www.rmg.co.uk/discover/explore/prime-meridian-greenwich

What is the Prime Meridian and why is it in Greenwich? (2018, February 13). Retrieved from https://www.rmg.co.uk/discover/explore/prime-meridian-greenwich

Link to Google Document with selections from What is a Satellite? article from NASA - https://docs.google.com/document/d/1JY9ra24REUCfcgaCIOyldhP0AigJREvVwPYnG39U04E/edit?usp=sharing

Article from NASA - What is a Satellite? - https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html

Dunbar, B. (2015, June 16). What Is a Satellite? Retrieved from https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html

Video (National Geographic field botanist): https://www.youtube.com/watch?v=WqPhTfaTock

N. (2013, December 31). Onward: Hawaii Botanist Races to Save Rare Plants | National Geographic.

Retrieved from https://www.youtube.com/watch?v=WqPhTfaTock

Plant Kingdom Taxonomy (recommended laminated sheets)

Plant Kingdom Chart. (2013). In*Www.montessoriprintshop.com*(pp. 1-39). Montessori Print Shop.

Link to selections from 3 articles about classification/taxonomy for students to read: https://docs.google.com/document/d/1nHF0gMauYZIzU2GibZ24k9tzMOCgLUJuu7VgjMR09Ac/edit?usp=sharing

Link to good content and vocabulary for understanding maps: https://kidsgeo.com/geography-for-kids/usefulness-of-maps/

Usefulness of Maps - Geography for Kids. (n.d.). Retrieved from https://kidsgeo.com/geography-for-kids/usefulness-of-maps/

Article to be used in product differentiation for CPS lesson: https://www.tucsonlocalmedia.com/news/article_cf55ed22-fe40-11e4-88a8-ebe32c144104.html

Romeo, J. (2015, May 19). Arizona geocachers banned from land. Retrieved from https://www.tucsonlocalmedia.com/news/article_cf55ed22-fe40-11e4-88a8-ebe32c144104.html
