THINKit

VIRTUAL REALITY

Community Need

Our community needs

Tech Tool Ideas:

Career Connections:

Define the Problem

01 DEFINE THE PROBLEM

Our engineering & design goal is to...

Our community is...

Three Criteria! We are successful if...

Three Constraints! Our solution is limited by...

Gather Pertinent Info

02 GATHER PERTINENT INFO

1.

2.

3.

4.

03 GENERATE IDEAS!

04 REFLECT & SELECT!

05 DESIGN SOLUTION!

06 TEST & OPTIMIZE!

07 SHARE & REFLECT!

STEM WORKS THINKit

Community Need

VIRTUAL REALITY   **GIS**

Zoos and aquariums try to teach visitors about the animals and plants they keep. Posters or displays aren't often read and without traveling worldwide, it is hard to picture the environments these animal live in. Is there a new way for guests to learn about and experience the habitats of the flora and fauna?

Tech Tool Ideas:
Google Street View App
Aria Creator
ArcGIS Story Maps

Career Connections:
Biologist, Zoologist
360° Photographer
Virtual Reality Developer

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1. How can virtual reality be used to teach guests about flora and fauna?

2. Which flora or fauna will you focus on?

3. If you use images that are not yours, are they properly cited?

4. How does the technology work: Google Street View & Google Cardboard, Aria Creator, or ArcGIS Story Maps?

5. How will you digitally share or advertise the experience so a visitor knows what to do?

01	02	03	04	05	06	07
DEFINE THE PROBLEM	GATHER PERTINENT INFO	GENERATE MULTIPLE SOLUTIONS	REFLECT, ANALYZE, AND SELECT A SOLUTION	DESIGN CULTURALLY RESPONSIVE SOLUTIONS	TEST AND OPTIMIZE	SHARE AND REFLECT

Unit Extension Ideas

Connect to the NGSS Standards!

Introduce the viewer to the idea that habitats are unique and different geographic regions may have a unique diversity of plants and animals living on land and in water.

2nd

- ❑ **PE:** Biological Evolution: Unity and Diversity: 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
- ❑ **SEP:** Planning and Carrying Out Investigations
- ❑ **DCI:** LS4.D: Biodiversity and Humans
- ❑ **CCC:** (Project Dependent)

Communicate how the zoo imitates a habitat, since an organism survival depends on how well adapted it is to a specific habitat. Or explain how environmental or human caused impacts are predicted to effect habitat and have current or future impacts on of species survival. How are zoos often involved in conservation efforts?

3rd

- ❑ **PE:** Biological Evolution: Unity and Diversity: 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- ❑ **SEP:** Engaging in Argument from Evidence
- ❑ **DCI:** LS4.C: Adaptation
- ❑ **CCC:** Cause and Effect

Consider scientific, economic, and social implications of efforts trying to support conservation of biodiversity efforts to stabilize in ecosystems. Compare the complexity of the two different methods and communicate the proposed plan as well as success or shortcomings of each. Possible societal needs to consider: water availability/purification, nutrient cycling, soil erosion, food availability, medicine, etc.

6-8

- ❑ **PE:** Ecosystems: Interactions, Energy, and Dynamics: MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- ❑ **SEP:** Engaging in Argument from Evidence
- ❑ **DCI:** LS2.C: Ecosystem Dynamics, Functioning, and Resilience, LS4.D: Biodiversity and Humans, **EDP**: ETS1.B: Developing Possible Solutions
- ❑ **CCC:** Stability and Change

The completeness of an ecosystem is used to measure its health; certain conditions are indicators of overall health and keystone species have a huge influence. Create an interactive simulation or game, where the participant can make a series of choices that would ultimately effect the health of an ecosystem. The goal would be to mitigate negative impact and increase biodiversity. Consider including choices that would also have economic and social implications.

9-12

- ❑ **PE:** Biological Evolution: Unity and Diversity: HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
- ❑ **SEP:** Using Mathematics and Computational Thinking
- ❑ **DCI:** LS4.C: Adaptation, LS4.D: Biodiversity and Humans, **EDP**: ETS1.B: Developing Possible Solutions
- ❑ **CCC:** Cause and Effect

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Community Need
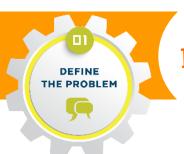
VIRTUAL REALITY · **DIGITAL MEDIA**

A group of exchange students from Japan are coming to your school next year. These students and their parents are both nervous and excited about what life is like where you live. A virtual tour could really help prepare the students and families for the upcoming year at your school.

Tech Tool Ideas:
Google Street View App
Aria Creator
ArcGIS Story Maps

Career Connections:
Journalist, Storyteller
360° Photographer
Travel Concierge

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Gather Pertinent Info

1. Are there ways or tools you can use to better support the communication of a second language?

2. What places would you share using virtual reality or virtual tours?

3. Are there any cultural or environmental differences that exchange students should learn about?

4. How does the technology work: Google Street View, Google Cardboard, Aria Creator, or ArcGIS Story Maps?

5. How will you digitally share the virtual tour with these students and their families before their travel?

Unit Extension Ideas

What sequence of information would be helpful to virtually see or experience prior to visiting a new country? Students sketch a plan to 'virtually shape' their 360° scenes and information by making a plan of the best content and the sequence or location of these images to be viewed within a virtual 360° setting.

K-2

- ❑ **PE:** Engineering Design K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- ❑ **SEP:** Asking Questions and Defining Problems
- ❑ **DCI: EDP:** ETS1.A: Defining and Delimiting Engineering Problems
- ❑ **CCC:** Structure and Function

After the design process, students reflect on how their experience relates to the following statements. (1) Team communication is an important part of the process and can lead to more design solutions. (2) Researching the problem prior to creating a solution helps to broaden and inform solution ideas. (3) Testing to see how it performs under a range of likely conditions helps improvement. (4) Criteria help you design a solution and constraints limit your possibilities.

3-5

- ❑ **PE:** Engineering Design: 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- ❑ **SEP:** Constructing Explanations and Designing Solutions
- ❑ **DCI:** ETS1.B: Developing Possible Solutions
- ❑ **CCC:** (Project Dependent)

Students compare and evaluate each other's virtual solutions, using constructive critique on how it meets criteria and constraints. Affirm parts of the solution that is helpful and gives advise on how to improve what's confusing. Students explain how they would (or wouldn't) utilize feedback and then redesign to improve their solution.
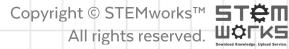
6-8

- ❑ **PE:** Engineering Design: MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- ❑ **SEP:** Engaging in Argument from Evidence
- ❑ **DCI: EDP:** ETS1.B: Developing Possible Solutions
- ❑ **CCC:** (Project Dependent)

As a team, using at least three criteria for design, focus and systematically approach a solution by making a plan for content. Make decisions about the priority of certain criteria over others (identify trade-offs).

9-12

- ❑ **PE:** Engineering Design: HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
- ❑ **SEP:** Constructing Explanations and Designing Solutions
- ❑ **DCI:** ETS1.C: Optimizing the Design Solution
- ❑ **CCC:** (Project Dependent)

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Community Need

VIRTUAL REALITY   **GIS**

Your relative just graduated and is going off to college. Your family is having a party to celebrate! Everyone wants a unique digital scrapbook where childhood memories can be geotagged, and new memories can be added!

Tech Tool Ideas:
Aria Creator (VR)
ArcGIS Story Maps
Google Maps

Career Connections:
Storyteller, Journalist
Geospatial Map Technician
Social Media Marketer

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1. How can technology be used to geotag memories to share a life story?

2. How should the information (visuals and quotes) be organized?

3. How can a story be told without posting personal information (internet privacy)?

4. What events or milestones might a family want highlighted?

5. How will the content be shared with family?

Process steps: 01 DEFINE THE PROBLEM · 02 GATHER PERTINENT INFO · 03 GENERATE MULTIPLE SOLUTIONS · 04 REFLECT, ANALYZE, AND SELECT A SOLUTION · 05 DESIGN CULTURALLY RESPONSIVE SOLUTIONS · 06 TEST AND OPTIMIZE · 07 SHARE AND REFLECT

Unit Extension Ideas

Connect to the NGSS Standards!

Brainstorm list of materials you might use to design a physical memory book. Diagram how each item may impact the environment. How does choosing to create a digital portfolio, (that can be viewed anywhere) reduce your families impact on the land, water, and living things?

K
- **PE:** Earth and Human Activity: K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
- **SEP:** Obtaining, Evaluating, and Communicating Information
- **DCI:** ESS3.C: Human Impacts on Earth Systems, **EDP**: ETS1.B: Developing Possible Solutions
- **CCC:** Cause and Effect

There are many hereditary traits that are passed from parents to children. Students can explore ideas such as eye, hair, and skin color. To dive deeper, have students look through family photos to see if they can find dominant traits that family members share like attached earlobes, tongue rolling, cleft chin, dimples, freckles, windows peak hairline shape, and more!

3rd
- **PE:** Heredity: Inheritance and Variation of Traits: 3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- **SEP:** Analyzing and Interpreting Data
- **DCI:** LS3.A: Inheritance of Traits, LS3.B: Variation of Traits
- **CCC:** Patterns

Compare and contrast various means of physical and digital memory book platforms such as: social media, virtual reality, ArcGIS Story Maps, videos, file folders on a computer, etc. Evaluation may include reliability, stability, sharing, copying, transferring, security, theft, etc. Using this information, decide which options may be recommended to criteria and constraints for a family.

6-8
- **PE:** Engineering Design MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **SEP:** Engaging in Argument from Evidence
- **DCI:** **EDP:** ETS1.B: Developing Possible Solutions
- **CCC:** (Project & design specific)

Evaluate advantages and disadvantages of a physical versus various digital means for a memory book: reliability, stability, sharing, copying, transferring, security, theft, etc. Comparisons may include: social media, virtual reality, ArcGIS Story Maps, videos, file folders on a computer, etc.

9-12
- **PE:** Waves and their Applications in Technologies for Information Transfer: HS-PS4-2. Evaluate questions about the advantages of using digital transmission and storage of information.
- **SEP:** Asking Questions and Defining Problems
- **DCI:** PS4.A: Wave Properties
- **CCC:** Stability and Change

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Community Need

A local store sells beach items and wants to advertise their products while teaching the community about ocean safety. They want to display 5-10 second stop motion animations or a 1-3 minute VR experiences that's eye catching, upbeat, or even funny to deliver a message.

Tech Tool Ideas:
HUE Animation Studio
Animation apps
Aria Creator (VR)

Career Connections:
Marketer
Storyteller
Animator

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1. What product will be advertised?

2. What will the safety message be?

3. Do the characters need to be human?

4. What is stop motion animation or what is virtual reality?

5. What will the script be? Is using humor appropriate?

6. Will a jingle help deliver a message?

7. How will the animation or experience be advertised in the store?

Unit Extension Ideas

Connect to the NGSS Standards!

Focus on a specific ocean habitat: reef or tide pools. Include the diversity of different kind of organisms and how humans can practice ocean safety to both stay safe and keep organisms safe.

2nd

- ❑ **PE:** Biological Evolution: Unity and Diversity: 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
- ❑ **SEP:** Planning and Carrying Out Investigations
- ❑ **DCI:** LS4.D: Biodiversity and Humans
- ❑ **CCC:** (Project Specific)

Project contains explanation on how a specific product being advertised is an environmentally friendly solution/choice for the habitat and animals that live there. (For example: reef-safe sunscreen or floats to use when snorkeling).

3rd

- ❑ **PE:** Biological Evolution: Unity and Diversity: 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- ❑ **SEP:** Engaging in Argument from Evidence
- ❑ **DCI:** LS2.C: Ecosystem Dynamics, Functioning, and Resilience, LS4.D: Biodiversity and Humans
- ❑ **CCC:** Systems and System Models

Research a current disruption of a physical or biological component of the reef ecosystem that has led to shifts in its populations of organisms. Use this information as evidence to support a claim for a needed solution to avert future ecosystem impact.

6-8

- ❑ **PE:** Ecosystems: Interactions, Energy, and Dynamics: MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- ❑ **SEP:** Engaging in Argument from Evidence
- ❑ **DCI:** LS2.C: Ecosystem Dynamics, Functioning, and Resilience
- ❑ **CCC:** Stability and Change

Research a natural or human-induced change in the reef environment that has contributed to the expansion of some species, the emergence of new distinct species, or the decline/extinction of some species due to the inability to adjust to change that is too drastic to be able to survive or reproduce. Use this information as evidence to support a claim for a needed solution to avert future ecosystem impact.

9-12

- ❑ **PE:** Biological Evolution: Unity and Diversity: HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
- ❑ **SEP:** Engaging in Argument from Evidence
- ❑ **DCI:** LS4.C: Adaptation
- ❑ **CCC:** Cause and Effect