ARCHI|TREKS

ArchiTreks gets kids excited about architecture, science, engineering, and more through fun and educational adventures as they explore and discover their surroundings.

Age Range: Kindergarten - 5th Grade

Subject: Architecture

Michigan LEARNING CHANNEL
A PUBLIC MEDIA PARTNERSHIP

Lesson 5: Sustainability

Lesson based on "Architecture: It's Elementary" Fourth Grade Lesson 7 pg. 321)

Lesson Intro:

What is the oldest home in your community? What if I told you, it wasn't even a house. Trees and other natural environmental features are home to many different species of animals. When architects are designing new buildings, they must consider how their construction will modify the natural world around them.

Lesson Duration: 60 minutes

Video Link: https://youtu.be/iAwYHWKK_gU

Objectives:

- Understand and be able to discuss their relationships between the man-made built environment and the natural environment
- Understand and be able to discuss how good design of the build environment can preserve the natural environment

Materials:

- Student Handout for each student
- Pencils
- Coloring Materials

Vocabulary:

- Ecology Environment
- Interrelate
- Sustainable
- Green Roofs

Lesson 5: Sustainability (continued)

Activity:

1. Read and discuss the lesson intro with students: "What is the oldest home in your community? What if I told you, it wasn't even a house. Trees and other natural environmental features are home to many different species of animals. When architects are designing new buildings, they must consider how their construction will modify the natural world around them"
2. Show video (see link above)
3. Develop a list of environmental programs that have an impact on the community and the environment. Discuss how these programs benefit the community and/or the environment.
   a. Recycling
   b. Refuse collection
   c. Tree planting programs
   d. Adopt-a-roadway programs
   e. Public Transit
4. Develop a list of good ecological man-made designs that have a positive impact on the natural environment. Examples of good ecological designs:
   a. Housing layout that is harmonious with the landscape: Roads are curved or winding, following natural contours; houses are sited to take advantage of the views and/or topography of the site; wetlands have been respected and preserved to be enjoyed by the residents; development is sensitive to retaining as many of the existing trees and rock outcroppings as possible.
   b. Roofs (including Green roofs) with overhangs that extend out far enough to shade the windows and keep sunlight out in the summer when the sun is high in the sky, yet still allow sunlight into the windows during the cold winter months when the sun is low in the sky. This design reduces the amount of heating required in winter and cooling required in summer and therefore reduces energy waste.

Lesson 5: Sustainability (continued)

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    c.   Buildings that collect energy from the sun for heating (e.g., solar panels).

    d.   Buildings that generate electricity by using windmills or water wheels.

    e.   Houses and stores placed close enough together so people can walk there.

5.   Continue with a list of designs that have a negative impact on the environment. Examples of designs with negative impact:

    a.   Factories (or homes) that use fossil fuels as their main source of power for manufacturing or heating. These designs pollute the air and use up precious natural resources.

    b.   Homes that use extra electricity because the design has too few windows for day lighting.

    c.   Homes that use extra fuel for heating because the windows, walls and roof are not adequately insulated.

6.   Review how the built and natural environments interrelate. In particular, discuss how natural resources are used to build the built environment. For example, we might cut down trees to provide building materials but through good forest management, the forest is replenished. We might remove a stand of trees to build a subdivision but use those trees to produce building materials. We might build a dam across a river so the water flows at a greater rate (pressure); in turn, the flow drives a turbine engine that produces electricity (similar to the flowing river turning an old-fashioned waterwheel).

7.   Take students on an sustainability search in your community. This can be done physically, or virtually (by using a digital resource such as Google Maps Street View). Discuss buildings or areas in the community that have been preserved in some way.

Lesson 5: Sustainability (continued)
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8. Have each student select a man-made item that impacts or interrelates with the environment. It can be either a negative or a positive impact item. Some examples are:
   a. Buildings with chimneys for burning fossil fuel
   b. Dam
   c. House with solar panels
   d. Refuse or recycle truck
   e. Sailboat
   f. Waterwheel
   g. Windmill

   Have students draw their selected item and explain how the item interacts with the environment.

Assessment Opportunity:

- Analyze the students' understanding of the importance of the built environment's role within the natural environment, with feedback-type questions pertaining to building designs, site designs and the surrounding natural environment.

Lesson 5: Sustainability

Explain It!!

Select a man-made item that impacts or interrelates with the environment. It can be either a negative or a positive impact item. Draw your selected item and explain how it interacts with the environment.

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Glossary

Adaptive Re-Use (noun) - To take an existing building that had one purpose and renovate it to be used for a different purpose

Arch (noun) - A curved structure, as of masonry, that supports the weight of material over an open space as in a bridge, doorway or gateway

Beam (noun) - A piece of wood, metal or stone that spans from support to support and holds the weight of the floor, roof or material above it

Circle (noun) - A plane figure bounded by a simple curved line; every point is equally distant from the point at the center of the figure

City (noun) - In the United States, an incorporated municipality whose boundaries and powers of self-government are defined by a charter from the state in which it is located

Civilization (noun) - Advancement in social culture characterized by relative progress in the arts, sciences and statecraft

Column (noun) - A vertical support for supporting horizontal structural members

Compression (noun) - The state of being pushed together or squeezed together, which results in a decrease in volume

Dilapidation (noun) - The natural deterioration of a building due to neglect

Dome (noun) - A hemispherical roof or one formed by a series of rounded arches or vaults on a round or many-sided base

Domesticate (verb) - To tame, as to tame a wild animal; To accustom to home life

Ecology (noun) - The branch of biology that deals with the relationship between living organisms and their environment

Environment (noun) - All the conditions, circumstances and influences surrounding and affecting the development of human habitat for both shelter and community

Flying Buttress (noun) - An inclined masonry structure outside of the wall of a building; connected to the building by an arch designed to resist the outward pressure imposed by a vault or the building's roof; usually found in Gothic churches

Forces (noun) - Strength, energy, vigor and power

Glossary

Gravity (noun) - The force that tends to draw all bodies in the Earth's sphere toward the center of the Earth

Green Roofs (noun) - A living roof that is partially or completely covered with vegetation, and which provides extra insulation and provides a habitat for wildlife.

Historic (adjective) - Referring to an example from the past

Interrelate (adjective) - To be interconnected

Landmark (noun) - Any prominent object marking a locality, often one of historical interest; Any object on land that serves as a reference point or a destination point

Neighborhood (noun) - A community or district composed of people living near one another

Nomad (noun) - People who travel from place, never permanently settling in one area

Preservation (noun) - Protection from harm and/or damage

Rectangle (noun) - A four-sided plane figure with four right (90-degree) angles; the opposite sides are parallel and equal

Restoration (noun) - The act of returning a building to its original condition

Semicircle (noun) - A circle cut in half

Shape (noun) - That quality of an object which depends on the relative position of all points composing its outline or external surface; physical or spatial form

Square (noun) - A two-dimensional figure having four equal sides and four right angles

Sustainable (noun) - Meeting present needs without preventing future generations from being able to meet theirs; includes respect for the environment and for people

Tension (noun) - The state or condition of being pulled or stretched

Triangle (noun) - A geometric figure having three angles and three sides

Vault (noun) - A masonry covering over an area which uses the principle of the arch