Eco Friendly Dream Home STEAM Lesson Brief

Students use knowledge from across the disciplines (S.T.E.A.M.) to strengthen their understanding of each subject’s content and its related careers through topic or theme oriented realistic problem-based activity-rich lessons.

Theme that this lesson would tie to: Ecology and Construction

Specific Topic Concept within that theme: Design and Engineering

What does an ecofriendly home look like, and how am I going to design and construct my home?

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<tr>
<th>PROJECT IDEA + brief notes &amp; supplies</th>
<th>BASIC CONCEPTS</th>
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<tr>
<td>Concept: Students will research, design, market, and construct an eco-friendly home. Students will have to calculate the materials expense by deciding what materials and how much of the material will be used for building and designing the interior of a room (MA). Before research has begun on figuring out the eco-friendly features of today’s homes, the students will have to decide the climate in which their homes will be (SS). This will be important in figuring out the heating or cooling systems for the design. After the design is finished the students will role play the jobs of the interior designer and the engineering. Role playing will be based on the eco-friendly features the students researched and layout of the home created. (LA) The interior design will use artistic terms and concepts learned during role play he/she has learned such as balance, rhythm, color, contrast, intensity, contour, horizontal, vertical, positive and negative space etc. (FA) The rooms within the structure will be designed and created on a computer program (T). A Brochure will be designed to sell the home that the students design (LA, FA) While the entire focus is on the engineering and technology used to create a researched based scientific eco-friendly home (SC). The finally is going into the gym and recreating the design on a large scale in the gym (MA, E) and playing a game within the structure (PE).</td>
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The concept of this plan is to create a design of an eco-friendly home and calculate what it
would cost and what way be the most cost efficient to design it. Students will role play and play a game in the gym at the end of the project by recreating one of the plans on the gym floor.

Basic Plan:

Teach about energy resources. Have students research eco-friendly home designs, local laws. An engagement/introduction piece will begin with showing the students a video of efficient sustainable homes and how they are different than the older homes. We will be looking at the cost reduction and the carbon footprints also. Students will then design their own dream home that is eco-friendly. It will be created in a computer-based app or program chosen by the students and be displayed through the SmartBoard for everyone to see.

Skill level (Grade Range): Upper elementary

Timing of Lesson: one week in Science/Technology/Engineering (5 days of 50 min periods)

Basic Supplies:
- Computer
- PDA
- Paper
- Paint
- Printer
- Rulers
- Magazines
- Recycled materials

All Subjects: computer/tablet access

Individual Subjects:

- **Standards** -
- **Careers** – architect, engineer, computer programmer
- **Project** – the class will decide on a program to use and design a dream eco-friendly home. The home is limited to three bedrooms, one of each: kitchen, dining, living, and extra room for a layout within 1500 square feet. They are to design and build a scale model dream home based off of their design using their computer program. Students will pick a location where their home will have the most adequate consideration for solar energy. They will research what eco-friendly means and what materials are considered eco-friendly. Each student will be able to choose their dimensions. Include the number of rooms, bathrooms, kitchen, living-room, and any other rooms that will be in the home.
- **Assessment** – Students will be assessed by their design and use of the program. Do the students understand the program and how to manipulate it? Is the scale model accurately built to represent the CAD drawing? Is their plan to be efficient feasible? Does the site layout and window placement make sense for passive-solar elements?
- **Extension** - Create a greenhouse for the home and specify how much food will/can be produced in the greenhouse based on the square footage. Keep in mind consideration of location for ampule sun for passive-solar effect. What eco-friendly materials will you use for your garage?

**Math** –
- **Concepts** – calculate cost of building home, calculate square footage of rooms, amount of paint and other materials (floor covering, curtains) needed to finish home, reduction of carbon footprints
- **Goal / Objectives** – Students will calculate cost of materials and other furnishings for their home.
- Calculating their carbon footprint.
IT Resources:
* Ap for designing home- HomeDesign 3D-Free (Anuman)
  www.anumaninteractive.com/en/brands/home-design-3d/

  *AP- Homestyler Interior Design-( Autodesk Inc.)
  www.homestyler.com/mobile

  *www.floorplanner.com

  *Ap- Planner 5D https://planner5d.com/

Other Resources:
Lowes
Home Depot
Louis Perry Associates (Architecture)

Misc:

Photos:
Student Samples

• Standards -

  • Careers – construction company manager, construction engineer, carpet salesman, technical assistant

  • Project –Based on the previous square footage or 1500 sq.ft., students will have to add in a savings rate and calculate how many years of efficiency is needed before the extra cost of eco-friendly products are paid off by the savings. Students will look up rates for then students will calculate how much it will cost to make their dream home. Students will compare and contrast the costs of eco-friendly materials & building practices vs. regular materials. The data will be represented in a chart that will break the costs into these two categories. Their research will allow them to calculate whether going with eco-friendly materials will save them money or the environment or both and how. Students will observe the cost related within the two categories and this in return will help them list each item they are choosing to use within each category and add the expenses showing the net total. Then they can calculate the taxes that are charged within the state. To give the grand total. This will help students to classify their wants into high priority to low priority. Students may realize the expense and the cause of the expense only after getting the prices and adding the costs for the items. Supply and demand will be covered within the time frame and students will learn that the more the economy wants eco-friendly materials the less the prices are going to be depending on the amount available.

  • Assessment – students will present their findings on eco-friendly and non-eco-friendly materials creating a visual display. All students will display their replacement materials (eco-friendly replacing the not so eco-friendly materials)

  • Extension – create a calculator specifically for eco-friendly homes compared to non-eco-friendly homes that calculates the difference

LA –
- **Concepts** — create brochure or webpage to promote and sell your home.
- **Goal / Objectives** — persuasive writing practice
- **Standards** -
  - **Careers** — advertising, marketing, real estate agent
- **Project** — create brochure that includes the furniture and what materials it is made of to make it eco-friendly. Include also the materials used to build the home, and what was used for the flooring. Make sure that materials have been researched and that you include why it is eco-friendly.
- **Assessment** — brochure with all aspects of the home explained comparable to realtor.com. The brochure will need to include the square footage of the home you have created, how many rooms, bathrooms, bonus room, amenities, and the square footage of each. The writing will be graded by the completion of the brochure. The brochure needs to have a persuasive paragraph to get the future buyer interested in your home. Make sure to Wow the viewer of your brochure. Think: What makes my brochure better than others. Grading will be completed with a rubric.
- **Extension** — make a brochure for a local home really for sale using Zillow.

SS –
- **Concepts** — research local laws about how and where they can build their home
- **Goal / Objectives** — research piece of land and local regulations
- **Standards** -
  - **Careers** — local government official, building/code inspector, activist, civil planner
- **Project** — Students will locate a piece of land that the student would like to build their dream home on and design their home accordingly to the codes for that area. Students will have to research what they will
have to change if anything, in their design due to building codes and laws. (For example, if you want to place your dream home on Lake Thurmond, you may find out you cannot build a permanent structure on the lake shore by law of the Core of Engineers. Therefore you may want to either restructure your home to make it removable or relocate.) Be aware that there are certain restrictions and know those restrictions before you design. If you are building a home that is majorly different from the others in the area. You may need to have special approval.

- **Assessment** – Was the student able to find a place for their home or adapt their home to the necessary requirements to fit on a piece of land of their choice? Was the student able to show how their home would best oriented on the site for the best passive solar setting?

- **Extension** – write about the social and habitat impact of house building. Look at the average square footage per person in different regions in the world and analyze the movement of the “Tiny House”. How would these things enhance the environment in your area?

**Art** –

- **Concepts** – create interior/exterior of home aesthetically pleasing and design a well thought out blue-print. Focus on balance, space and make sure you

- **Goal / Objectives** – add color and design elements to the home and produce an eco-friendly designed blueprint. Have your floor plan make sense and have a logical flow and balance of design.

- **Standards** -

- **Careers** – interior designer, colorist, architectural designer

- **Project** – consider color, architecture, and living in the home to create an environment the student finds pleasing. Create organized blue prints for home. The design and color scheme needs to relate to eco-friendly reasoning. Example: cool colors for
bedrooms for a calming effect or warm colors for a room that you may want to feel more energy in. What paints are considered eco-friendly? Latex vs. Oil
-Assessment – in the 3D representation, all interior and exterior aspects of the home have color and design elements incorporated. Are their blueprints well laid out? Students will create an interior design binder broken down by rooms. Label pages with the Room. Each page will include the interior swatches of paint color choices, wallpaper, designed furniture, texture of walls, and any other carpet styles. Make sure to include all eco-friendly aspects of each material used.
Extension – Analysis a room in your home. What small changes can you do to make it more eco-friendly?

PE –
• **Concepts** – map out home on gym floor to make games/races doing daily activities in home
• **Goal / Objectives** – helps students see if the layout of the home works well and gives them exercise while having fun
• **Standards** -
• **Careers** – PE teacher, engineer, physical therapist
• **Project** – As a class, map the first floor of one of the homes designed on the gym floor, design an obstacle-course styled activity based on doing household movements for classmates to promote exercise.
• **Assessment** – participation in the games of classmates
• **Extension** – Using recycled materials or donated materials, build an actual model of your eco-home to scale or full size depending on how much time/resources are available

Music –
• **Concepts** – add music to created video to sell home
• **Goal / Objectives** – Produce video with music
• **Standards** -
| Careers – music advertising agent, composer, musician
| Project – Students will create a video and find music (their own or from the internet) for the video that fits the mood they want to create that they think will sell their home. They can incorporate their pictures into the app iMovie, [https://www.apple.com/ios/imovie/](https://www.apple.com/ios/imovie/)
| Assessment – completing the video with music – Does the music go with the style of home designed or the audience being marketed?
| Extension - |