LESSON TITLE: THE ENVIRONMENTAL IMPACTS OF BUILDING A HOUSE

TOTAL TIME: ONE 60-MINUTE PERIOD

BRIEF DESCRIPTION

In this *The House That STEM Built* lesson, students will get the chance to explore various environmental impacts that occur throughout the house-building process. Students will explore and compare building methods and materials that support sustainable development allowing them to make environmentally conscious decisions in the future.

CURRICULUM OUTCOMES

Taken from the New Brunswick Introduction to Environmental Science 120 curriculum.

GENERAL CURRICULUM OUTCOMES

Unit 2: Sustainable Development, Sustainable Ecosystems and Communities, Principles of Sustainable Development.

SPECIFIC CURRICULUM OUTCOMES

- Explain the principles of sustainable development.
- Demonstrate an understanding of the requirements for sustainable human communities.

NEW BRUNSWICK GLOBAL COMPETENCIES ACHIEVED[1]

- Sustainability and Global Citizenship
    - Learners take actions and make responsible decisions that

1 https://www2.gnb.ca/content/dam/gnb/Departments/ed/pdf/K12/curric/competencies/NBCompetencies.pdf?fbclid=IwAR1ldrZs1gFgiNm8rC4oz7Fmx6mSn-6t_QJkenev0eD33rZ-foYYn6bmdmc *also available at* https://tinyurl.com/nb-competencies

support social settings, natural environments, and quality of life for all, now and in the future.

- → Learners understand the interconnectedness of social, ecological, and economic forces, and how they affect individuals, societies, and countries.

LEARNING OBJECTIVES

Learners will

- → be able to describe at least 3 sustainable building practices,
- → identify areas in which houses can be built sustainably,
- → compare and contrast various building practices, and
- → work in teams to conduct research.

MATERIALS

- → Video: *The House that STEM Built: The Environmental Impacts of Building a House*.
- → Copies of the "This or that" activity (1 per pair of students).
- → Access to mobile devices that are linked to the internet.
- → Optional: print out copies of the Venn diagram graphic organizer (1 per student).

BEFORE CLASS

- → Print out the first page of the "This or That" activity and cut up

the squares.

- → Print copies of the “This or That” activity.
- → Optional: print copies of the Venn diagram graphic organizers.

WARM UP: 15 MINUTES

GROUPING: INDIVIDUAL, PAIRS, ENTIRE CLASS

- → Ask students what first comes to mind when they think of the term “sustainable development”.
- → While students are thinking, draw a giant Venn diagram on the board.
- → On one side write “sustainable development”.
- → Ask students to share their thoughts with a partner.
- → After they have shared with their classmates, students can share with the class some of the ideas that they thought of related to the term.
- → Next, ask them what they think it takes to build a house. This can be broad or specific. “If I wanted to build a house right now what would I need to do?”
- → Write on the other side of the Venn diagram “house-building”. Once students have been given the opportunity to think and share with a partner, add any suggestions mentioned to this side of the Venn diagram.
- → In the middle of the Venn diagram write “sustainable building practices”. Tell students that they are going to watch a video and pick out any sustainable building practices that they notice to add to the Venn diagram.

ACTIVITY: 35 MINUTES

GROUPING: INDIVIDUAL AND PAIRS

Watch *The House That Stem Built* video. Feel free to pause the video

and ask some or all of the following open-ended questions to prompt discussions.

- 0:46 – If we are considering the initial building site (water, trees, space), is there anything that the builders should consider right away (water contamination, bank stability, tree removal, potential future erosion etc.)?
- 1:58 – What sort of organisms might be living beneath the soil that might be impacted by the weight of the machines? Do you think this will improve or become worse after the house is built?
- 2:24 – What sort of mitigation strategies could be used to minimize the environmental impact of noise, pollution, and waste on the animals that are living in the area?
- 4:41 – What were some of the main environmental impacts that were mentioned in the video?

Once the video is finished, ask students if any sustainable building practices were mentioned. You can add those to the centre of the Venn diagram.

GROUPING: PAIRS

In pairs (or teams depending on the size of the class) students will choose one aspect of the building process and compare different options available to new home builders.

Allow each team to choose one of the “This or That” squares which will give them a starting point for the activity.

Provide each team with the rest of the “This or That” activity and allow them to answer the questions.

CONCLUSION: 10 MINUTES

GROUPING: ENTIRE CLASS

Bring students back together and ask each group to share one thing

that they learned that really stuck out to them.

- → Anything surprising?
- → Which options are most economically viable?
- → Which options were the most sustainable?
- → Were there any surprises?
- → Are there any other stages of the building process or materials that could be changed/modified to make house-building more sustainable (alternative water or electricity sources, compost, food gardens instead of flowers, alternative animal habitats etc.)?

Add any additional ideas to the centre of the Venn diagram.

DIFFERENTIATION

CONTENT

Use *The House That STEM Built* video to spark a conversation about sustainable practices in your

- → school,
- → community, and
- → current house.

PRACTICE

Are there any professionals in your area who might be a good resource or who could speak to some students?

Individual copies of the Venn diagrams can be handed out so that students can copy and organize their notes from the class discussions.

Students can watch and host discussions in smaller groups (4–6 students) or as individuals instead of as a full class.

PRODUCT

Instead of returning their research in a form format, ask students to write a reflection on one interesting fact they learned.

Students can demonstrate their learning by explaining which options they found more efficient in a video (Flipgrid is a platform that works well https://info.flip.com/).

If students are exploring house design, ask them to design a floor plan and explain why they designed it the way that they did.

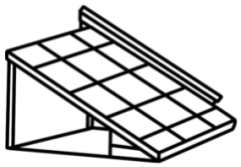
Allow students to make a pamphlet advertising why their building product/material is the most sustainable option for homeowners.

Students can interview a local professional who is working in the sustainable building industry and find out the benefits of sustainable materials first-hand.

EXTENSION

Instead of asking students in groups to investigate one of the building processes, tell students that they are being tasked with building a house. It is their responsibility to consider 3 of the components mentioned, as well as 2 other sustainable building materials/practices to investigate. How do they measure up compared to the traditional materials? Are they available in Canada? Are they more or less affordable than traditional materials in the short term? Long term? Approximately how much money would it cost to install or use these other materials or tools?

Are there any sustainable practices that could be taken on by your school? Put together a project plan and ask administration if there are any possible supports that you could obtain to carry it out (e.g., recycling or composting programs, solar panels, vegetable gardens, and removal of single-use plastics).



What does it take to build a house?

Sustainable Development

House Construction

Sustainable building practices

This or that?

High efficiency appliances vs. traditional appliances	Landscaping with native plants vs. introduced species	Landscaping with lawns (sod) vs. alternative non-lawn options (rock, wildflower, garden)
Natural gas vs. heat pump	Septic system vs. aerobic treatment systems	Fibreglass insulation vs. rockwool insulation
Window placement. south vs. north, east, or west	Open concept vs. multiple rooms	Well vs. rainwater harvesting system

This or that?

Group members :

Congratulations! The funds have come through! It is time to build a house. What sort of options do you have? Which options are the most sustainable? Which are the most cost efficient? Use the following activity to help guide you through researching the best options for your new home.

Building materials/ practice: _____ Vs. _____

1. It is always best to start with a pros and cons list. What are upsides and downsides of each option? Try to come up with at least 3 for each.

Option 1:

Pros
(what is good about this option?)

-
-
-

Option 2:

Pros
(what is good about this option?)

-
-
-

Option 1:

Cons
(what is not good about this option?)

-
-
-

Option 2

Cons
(what is not good about this option?)

-
-
-

2. Financial Input. How much is this going to cost? Compare the price of both options.Is one more economical than the other? Provide details.

3. Which is the most environmentally friendly? Why is that?

4. Final thoughts. Which option would you use for your house? Why? Are there different options that you would consider outside of the two you researched?