**Lesson 7: Revise Your Farm Design**

**Problem Statement:**

“Dear Diary,

Mom and Dad said that we have to move to the country because we want more space and they want to be someplace quiet. I don’t know where we are planning to move but I know I’m sad that I’m leaving my friends. Mom says I can still chat with them online, and my computer and XBOX will be powered by poop! LOL!!

I’m really wondering how I can power my XBOX with poop. Do I just plug it into a pile of poop? I think living on a farm I’ll have a lot of chores. I wonder what I’ll have to do.

My parents said there will be lots of ways for us to get power for our house. We can use solar panels, wind turbines (whatever those are!) and even something called a “digester” that can break down poop (and some other materials) and use it for power. Wow! We can even use falling water to make power. Mom and Dad says we will be able to get all the power we need without even needing to get electricity from the city. They even said living like this will be better for the environment and we’ll be polluting less. How in the world will we be able to do this?

I’m really excited to learn about how sun, wind, and poop can make power. I also can’t wait to have so many animals! Plus, my parents said I get to actually help design the self-sustaining farm! I guess I’ll give it a try.”

**Learning objectives:** Students will be able to revise their farm house design based upon their wants and needs for energy production and consumption.

**Lesson standards (NGSS, CCSS, CTE):**

**NGSS**

* 4-PS3-1 - Use evidence to construct an explanation relating the speed of an object to the energy of that object.
* 4-PS3-2 - Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
* 4-ESS3-1 - Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

**CCSS**

* CCSS.ELA-LITERACY.SL.4.1.A Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
* CCSS.ELA-LITERACY.SL.4.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* CCSS.ELA-LITERACY.SL.4.1.C Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
* CCSS.ELA-LITERACY.SL.4.1.D Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
* CCSS.ELA-LITERACY.W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

**Soft skills:**

Collaboration, communication

**Locally and/or personally relevant for students:**

* Personally Relevant: materials used to build a home, knowledge of the standard Western lifestyle
* Locally Relevant: begin to think about different sources of energy; where their own energy may come from; generating interest and knowledge for future job opportunities

**Connections to career and educational pathways:**

* Students are engaging in the engineering and design processes by developing solutions to a problem and testing the theory to refine their designs.
* Students will gain an interest in STEM fields by designing sustainable homes and learning about the benefits of renewable energy versus the way we use energy in our traditional homes.

**Materials:**

See Lessons 5 and 6

**Lesson preparation:**

**Time required:**

See lessons 5 and 6

**Grouping of students for instruction:**

See lessons 5 and 6

**What is the instruction? Consider the PBL Procedure that is being addressed here:**

**Understanding the Problem**

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| 1. Tie-in from lesson 6 | Revisit their design from lesson 6 and discuss changes and revisions to their designs |
| 2. Provide students with time to review their farm house designs and select their preferred items for energy consumption and production. | Reviewing farmhouse designs and reviewing the choices they made in the previous lesson--household items that would be absolutely necessary for their household. |
| 3. Ask “What kinds of items were removed?” | Students share out what items they took out of their design. |
| 4. Ask “What kinds of items were added?” | Students share out what items they added to their design. |
| 5. Gallery Walk | Students have final drafts out so teacher and students can walk around to view peers’ designs. |
| 6. Close Out Discussion | Discuss any similarities and differences between each others’ designs, what did another team think of that your team did not, what might you consider if you were to do another design, and what have you learned about energy that might affect how you use it from now on? |

**Accommodations:**

See lessons 5 and 6

**Extensions:**

See lessons 5 and 6

**Assessment:**

* Formative Assessment: Students present their farms to the other students and teacher in the form of a gallery walk.
* Summative Assessment: Revisions produce enough power to power their designs.

**References/Resources:**

Instructional Plan Created by Kristyn Reid, Teri deCocq, Amie Jette, Maria-Elena Velasquez, Catie McCready, Samuel Foley, Samayyah Williams