Glowing and Sounding Cottage

Teacher:	Grade: 4	Time: 1 Hour:

Unit Title: Glowing and sounding cottage	**Essential Standards:** **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-PS3-4.** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Objectives: After this lesson, the students will know how to use Neuron modules; understand the working principle of human infrared sensors, LED drivers and other modules; learn to collaboratively work with others; and be able to use Neuron modules to make their own works.

Student Group: Group work, pair work

Materials/Resources		Essential Vocabulary
Teacher: Neuron, materials, PPT, worksheets	**Student:** Neuron, materials	Electricity, light energy, sound energy, human Infrared sensors, remote control, programming, and cooperative learning

Learning Experience

Inquiry Based Learning: ☐ Use of the 5 E Lesson format Learner– centered instruction ☐ Use of scientific investigation, problem Solving or engineering design ☐ Hands on– minds on instructional strategies ☐ Use of Process skills in context-predict, observe, measure, classify, infer, communicate	**Engage: Activating Strategy/Hook** (Observation) • The teacher introduces the Christmas stories; wait for the Christmas gifts from Neuron and think how to decorate the Christmas cottage. • The teacher show the students the Christmas cottage made by him (a smart cottage that can sense lights and have a doorbell.) • The students have 3 minutes to take a close look at the smart cottage, as well as all Neuron modules used, etc. • The students observe and explore the function of each neuron module • The teacher will explain the function of each neuron module in detail
	Explore: Learning Experiences (Thinking) • The teacher distributes Form 1 and explains what needs to be filled up • The students work in pairs to design a structure to achieve all functions of the Neuron. At this time, the teacher needs to guide the students regarding how to learn collaboratively and share work duties. (For example: one person acts as a structure builder and the other a tester)

☐ Peer Discussion– scientific arguments and explanations ☐ Use appropriate tools accurately ☐ Focus on detail- precision & accuracy in observations and measurements ☐ Use of collaboration for learning	• The students have 8 minutes to build the structure according to their design (remind the students to consider time spent and materials to be used during the design process) • The students have 2 minutes to report to the teacher regarding their final design (according to Form 1)	

Explain: Learning Experiences (Actual practice + immediate direction)

• The students have 30 minutes to build the structure according to their design

• The students should report any problem immediately

• The teacher will walk around the classroom and provide help and guidance as required

Elaborate: Extending & Defining (Communication and share)

• The teacher distributes Form 2. The students have 3 minutes to report their works based on the four key points

• The students have 5 minutes to show their works

Evaluate: Summarizing Strategy (Summary)

• The students conduct self-evaluation (allow the students to evaluate their own works and the entire process, from personal perspective and team perspective.)

• The teacher evaluates according to the process and results (there is a corresponding evaluation form)

• Review what learned

Differentiation Strategies		
Extension	**Intervention**	**Language Development**
Adding programming contents	Simplify the structure	The names of the Neuron modules

Assessment(s) :

Teacher Reflection:

Explore the impact of different materials on sound emissions

Lesson Description:

With the knowledge of the topic and under teacher's guidance:□Explore the sounds around you; □Use NEURON sensor to obtain test results; □Learn to record statistic data in tables, and analyze the data and make conclusion;

Objectives:

Level: Elementary School (10-12 Years Old)   Difficulty: Intermediate   Time: 50 Minutes

List of Materials:

√   NEURON Modules
   ◆Power 2PCS   ◆Knob   ◆Button   ◆Sound Sensor   ◆Buzzer ◆Display

√   Files
   ◆Teacher guide PPT   ◆Test tool model   ◆Student worksheet

√   Attachments and files
   ◆Computers ◆Sound files ◆Product videos

Teaching Process:

STEP 1: Preparation (3 mins)

1.   Teacher's self-introduction, getting to know each other, and be familiar with the environment;
   The teacher and the students getting to know each other;

2.   Classroom Rules;
   Such as: raising hands to answer questions, friendly sharing materials, etc;

STEP 2: Lesson Description (10 mins)

1.   Have you been listening to the sounds around you?
   Have we been paying attention to various sounds around us? Listen carefully to the sounds surrounding us;

2.   Guess what you've heard (play audio) ;
   1)   Distribute worksheets
   2)   Play audio for various sounds

3.   Objectives: Explore the impact of different materials on sound reflection;

STEP3: Learning (10 mins)

1.   Provide directions via scenarios, introducing the students into the lesson;
   When we shout in an empty room we can hear the echo, but if the room is filled with furniture we couldn't hear any echo. Why?

2.   Learn the offline mode of NEURON;
   1)   Distribute Knob, Buzzer, Power (2 PCS) ;
   2)   Learn to make the Buzzer sound as shown in the PPT;
   3)   Provide Sound Sensor and display, and learn how to use them
   The teachers can refer to the guidance PPT

STEP 4: Exploration (10 mins)

1.   Raising Questions;

    Do materials have any effect on the echo? What material has a greater impact on the echo?

    The teachers can refer to the guidance PPT

2.   Making Assumptions;

    Based on existing materials, make assumptions about the degree of influence of the materials on sound reflection

    The teachers can refer to the guidance PPT

3.   Making Plans;

    Use the tools provided by the teachers to make plans.

4.   Recording Data;

    Record the actual data measured.

5.   Processing Information and Reach Conclusions

    Perform group discussion and reach conclusion regarding the data measured.

STEP 5: Share (5 mins)

1.   What conclusions have you reached from the experiments?
2.   What fun features have you found in this lesson?
3.   Can you repeat these experiments using the materials of this lesson?

STEP 6: Finishing (2 mins)

1.   Organize the modules
2.   Clean up desks