Electrified Play Doh Squishy Circuits

Name of Project: Electrified Play Doh Squishy Circuits		Duration: 2 class periods
Grade Level(s): 4th	Teacher:	Subject/Course/Unit: STEAM 4th grade
Big Idea:	Using Squishy Circuits, students will design a working circuit that lights up an LED.	
Authentic Purpose: (Why does this matter to your students?)	Electricity is a tool that enhances everyday life. Without electricity everyday items would be unusable.	
Future-Ready Competencies: • Collaboration • Communication • Critical Thinking/Problem Solving • Creativity & Innovation	Objectives: Students will explore materials to determine which materials are considered conductors and which are insulators. Students will demonstrate how to build a closed circuit while avoiding short or open circuits. Students will demonstrate their understanding of a circuit by converting electrical energy into light energy.	
Project Statement: (Include: issue, problem or challenge; student role, purpose, beneficiary, and desired outcomes)	What if a storm knocks out the power to your home? How can this be fixed? How do electricians get power up and running again during a storm? What conductors would be helpful? What would be harmful?	
Empathy Anchor: (How will students develop empathy and care about this problem)	Students have experienced a power outage and all of the difficulties that come with it. Thus, students will develop a further understanding of electricity and the level of difficulty that electricians face when attempting to set up a current.	
Public Audience & Reveal: (Experts, audiences, or product users students will engage with during and at the end of project)	Possible electrician?	
Knowledge Construction: (How are students going to construct content knowledge and practice it) After students explore Squishy Circuits, they will return to their classrooms and use simple batteries, lights, and wires to continue to explore circuits. When students have mastered this skill they will add in fans and fans and buzzers.		Student Assessment: Did they develop a working circuit? Did they separate materials into conductors and insulators?
Design Process: 1. Discover 2. Research & Empathize 3. Brainstorm 4. Choose 5. Build 6. Test 7. Communicate 8. Redesign	1. Today we are going to talk about electricity! Who can provide me with some examples of things we use in our daily lives that require electricity? [Gather ideas from students and write on board] 2. Discuss what happens when there is a severe storm, or a power outage? How do people light their homes? Heat their homes? What are the pros/cons of an alternative light/heat source? 3. Explain that students are going to act like electricians today and restore power to homes that have lost power in a recent storm. Start with Safety First. VERY Important. Just like an electrician, you need to understand that the 2 wires extruding from the battery pack should	

<table>
<tr><td></td><td colspan="2">NEVER touch each other. It will short out the battery pack and ruin it.
4. Discuss Conductors and Insulators. Have a table with materials and have students place materials into conductor/insulator piles.
5. Now introduce Squishy Circuits. Begin by letting students explore the materials. There is a battery pack, wires and play doh, lights, buzzer.
6. What could we be making? (Circuit…but why Play doh?)
7. Ask students if they can figure out how to light an LED using the play doh (conductive dough), so that the LED is not in direct contact with the battery pack.
8. Let students play with the materials and try different ways of lighting the LED(s).
9. After some exploration time, start a discussion with students on what arrangements worked and which didn't. Why did some arrangements work and some not?
10. Let's try what worked. Move the discussion towards why they think the conductive dough worked to light the LED. What type of material must the Play-doh be (conductor or insulator)? What do you think makes it a conductor? (Students will not know this, but allow them to use prior knowledge to come up with answers. After a brief discussion, explain that dough is primarily made of salt, water, and flour. Salt is the magic ingredient that makes it highly conductive.
11. Regroup and discuss the level of difficulty to create a working circuit that made the LED work. Discuss the difficulty an electrician would face working in a storm attempting to make a circuit to bring power back to homes and businesses.
12. End lesson by allowing students to create a circuit that would allow the buzzer or fan to work.</td></tr>
<tr><td>Resources needed:
(On-site people, facilities, tools, technology, materials, community connections) Squishy Circuit Kits, Teacher, STEAM teacher, materials to be tested as insulators/conductors</td><td>NYS Standards (content + CS & DF)
NGSS-4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-6 IC1.1 Describe computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices. 4-6 CT1 Develop a computational model of a system that shows changes in output when there are changes in inputs.</td><td>Student Reflection:</td></tr>
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