Light Up Your Art: Electric Paintings

Grade Level: 3rd to 5th Grade

Objective:

- Understand and apply the basic components of an electric circuit.
- Explore the concept of polarity in circuits and learn troubleshooting techniques.
- Creatively integrate functional circuits into personalized artworks.

Standards:

- **NGSS 4-PS3-2:** Make observations to provide evidence that energy can be transferred from place to place by electric currents.
- **NGSS 3-5-ETS1-2:** Generate and compare multiple solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Materials:

- Copper tape or aluminum foil
- 3V coin cell batteries
- 3mm or 5mm LEDs (various colors)
- Paper (thick enough to support the components)
- Pens, pencils, and coloring materials
- Tape or glue for securing components

Procedure:

1. **Introduction to Circuits and Polarity (10 minutes):**
    - Discuss the basic components of a circuit and introduce the concept of polarity, explaining how reversing the LED or battery affects the circuit's function. This video link explains polarity and how it applies to LEDs but not all circuit components… it's a little bland but it provides a visual for necessary understanding. Use it for teacher background knowledge or show it to the students: Polarity Video Link
    - Demonstrate how to connect an LED to the battery using copper tape, emphasizing the correct orientation for the LED's leads.
2. **Circuit Construction (25 minutes):**
    - Students construct their circuits on paper, attaching the LED and ensuring it lights up. You can use the template from the Makey Makey website. File is next to this downloadable lesson file on themadstemlab website.

    - If the LED does not light, guide students to troubleshoot by flipping the LED or the battery based on their understanding of polarity.
3. **Integrating Circuits into Art (30 minutes):**
    - Students design their artwork around the lit LED, planning their images to creatively incorporate the light as a functional element.
    - Execute the drawings, positioning the LED to enhance the artistic effect.
4. **Troubleshooting and Optimization (20 minutes):**
    - Encourage students to adjust their circuits if needed, applying what they've learned about polarity to ensure their LEDs shine.
    - Discuss the troubleshooting process and what was learned during the activity.
5. **Gallery Walk and Discussion (15 minutes):**
    - Students display their illuminated artworks and explain how they incorporated the LED into their designs.
    - Reflect on the challenges faced and the creative solutions found.

Guiding Questions:

- How did you decide where to place your LED in your artwork?
- What did you do if your LED initially didn't light up? How did you solve it?
- Why is understanding polarity important in creating circuits?

Assessment:

- Evaluate students on their ability to construct a working circuit and integrate it into their artwork.
- Assess understanding of polarity through their ability to troubleshoot non-functioning LEDs.

Extensions:

- Challenge students to create a multi-LED artwork with series or parallel circuits. This video explains how parallel circuits work better than a series circuit, and you could potentially have the students make a drawing where they incorporate multiple LED bulbs into their drawing. Parallel Circuit Video Link
- Explore other electronic components like switches or variable resistors to enhance their circuit designs.