| Objectives and Standards | Learning Outcome(s) | DEI Component |
|---|---|---|
| International Technology and Engineering Educators Association - Technology Standards: | - Describe the basic definition of a circuit.<br>- Define electrical current in a circuit.<br>- Explain how various circuit components modify electrical current<br>- Combine creativity with circuit engineering to create an electrical piece of art. | Major topic not related to STEM |

Instructional Directions

This activity is designed to take 50-90 minutes as presented below.

1. ENGAGE: Instructor discovers students' background knowledge.
    a. Icebreaker 1: "Has anyone ever built or tinkered with circuits? "
        i. Have students elaborate on what the circuit did and any difficulties.
    b. "What kind of circuits do you encounter in your daily life?"
        i. Poll, debate
        *ii. Examples*
2. EXPLORE: Students discover new concepts and put their knowledge into practice.
    a. Explore the different components that modify electrical current
        i. Resistors, capacitors, and inductors
3. EXPLAIN: Instructor answers questions and teaches new concepts.
    a. Instructor presents slides on components and explains how they modify electrical current to achieve a desired outcome
    b. Students practice with pre-made circuits
4. ELABORATE: Students participate in activity to deepen their understanding.
    *a. Instructor give directions*
    b. Students create a piece of art that uses paper circuit components.
5. EVALUATE: Instructor assesses student's understanding.
    a. Instructor asks reflection questions
    b. Students verbally answer reflection questions
    *c. Qualtrics*

Materials:
Each group needs…

- Printer paper
- Scotch tape
- Markers/Colored pencils
- Scissors
- Inductors (various values)
- Capacitors (various values)
- Resistors (various values)
- Coin batteries
- Copper foil tape
- LEDs

Lesson details corresponding to the slides: Electrical Art

| Activity | Lesson Plan |
|---|---|
| Introduction | Slides 1-2<br>- "Has anyone ever built or tinkered with circuits?"<br>- "What kind of circuits do you encounter in your daily lives?"<br>Slides 3-5<br>- A circuit in electronics is a completely circular, conductive path for electrical current to flow through.<br>- Normally composed of multiple components to modify the behavior of electrical current and result in various outputs<br>- Electrical current is the flow of electricity through a circuit<br>  - Magnitude (amount) of flow is measured in Amperes (A)<br>- Flows from the positive end (terminal) of the battery, through the circuit, to the negative end.<br>  - *Maybe describe it related to flow of electrons*<br>- Discuss how various components can be added to circuits to modify or use electrical current<br>Slide 6-8<br>- Describe purpose of resistors in circuits and how resistance values impact electrical current.<br>- Describe purpose of capacitors in circuits and how resistance |

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| | values impact electrical current.<br>- Describe purpose of inductors in circuits and how resistance values impact electrical current. |
| Experiment | Slide 9-12<br>1. Introduce the concept of paper circuits with slides 9 & 10.<br>2. Introduce the activity.<br>3. Discuss different creative ideas that can use circuit components and LEDs.<br>4. Show slide 12 with a few example designs.<br>5. During creation, have students explain their art and how they are incorporating circuit components into the design.<br>6. Provide feedback based on troubles students have with their design.<br>7. Have students clean up the materials. |
| Discuss and Reflect on Results | Slide 13<br>- Major observations and biggest takeaways?<br>● Do you feel more confident in your understanding of electronics and circuits?<br>● Do any of you plan to explore circuitry more in the future?<br>● Did you think you could combine engineering and art?<br>● What other combinations of art and engineering can you think of?<br>Slide 14<br>● Survey link |