KENAN FELLOWS PROGRAM
FOR TEACHER LEADERSHIP

Exploring Circuitry Using Hands On Technology: Makey Makeys

Lesson Aim

Students use guided inquiry to explore circuit building using the Makey-Makey discovery tool and everyday objects. Students will explore the basics of circuitry using common items that can conduct electricity and circuit building parts.

Packet Contents

Lesson Plan Tags

Check the standards that are met in your lesson plan, check all that apply.

☐Middle School ☑High School ☐6th Grade Science ☐7th Grade Science
☐8th Grade Science ☐Middle School Math ☐Middle School CTE
☐Biology ☐Chemistry ☑Physics ☐Energy Harvesting ☐Anatomy

☑Other High School Science ☐High School Math
☐HS Family and Consumer Science ☐HS BFIT ☐HS Marketing & Entrepreneurship
☐Agriculture ☐HS Technology ☐Trade & Industrial ☐Health Science

Introduction

Students will learn basic circuit and electric component uses. They will be able to explore how current electricity moves in a circuit and how sensors measure and respond to the environment. Students can work in small groups or individually to explore circuitry at their own pace. Students can be assessed formatively before and after on the function of specific electrical components. Students will also learn information useful for summative assessments.

Curriculum Alignment

Phy.2.3 Analyze the nature of moving charges and electric circuits.
Phy.2.3.2 Differentiate the behavior of moving charges in conductors and insulators.

PSc.3.3.1 Summarize static and current electricity

Objectives

Students will be able to design and create a device to perform a desired function.
Students will be able to design a circuit using a resistive sensor and Makey-Makey.

Time & Location

Class time: approximately 90 minutes
Location: Classroom

Teacher Materials

Laptops with internet access
Makey-Makeys (http://makeymakey.com/)
Alligator Clip wires (5 or 6 per group)
Play doh, fruits/vegetables, metal objects (5 or 6 per group)

Student Materials

Laptop with internet access (can be provided by teacher)

Safety

Some components get hot in circuit. Electronic components must be handled with care because of risk of shock.

Student Prior Knowledge

Basic knowledge of charge and electrical conductivity.

Teacher Preparations

Have laptops open to a browser and go to Makey-Makey apps. There are a variety of apps students can use to explore how to connect circuits. Some easy ones to get started with are the bongos (http://makeymakey.com/bongos/), the piano (http://makeymakey.com/piano/), and a jump game (http://www.adamatomic.com/canabalt/).

http://makeymakey.com/apps/

Set up the classroom stations ahead of time to ensure that all students can begin building as soon as possible. Each group should have a laptop, makey-makey plugged into usb, 5-6 play doh balls/fruits and vegetables/ metal objects, 5-6 alligator clip wires, and sensors/led lights.

Activities

Pre assessment questions: Teacher led formative assessment, can be verbal or ask students to write down their responses.

- How does electricity work?
- What is a resistor?
- In what direction does current flow from a voltage source?
- How can you troubleshoot a circuit if it is not working?

(5-10 min)

Teacher explains what a Makey-Makey is and how to set it up.

"Makey-Makey is a creative tool that communicates to a computer just like a keyboard, mouse, or video game controller. You can set it up to perform a task based on your input. To set up, plug the cord into a usb slot, then connect the other side of the cord to the makey makey board. Try connecting wires at different places on the board to make the circuits complete. When you make a successful circuit, the computer will interpret it as a button pressed like a keyboard and make a sound."

Set-up instructions: http://makeymakey.com/how-to/classic/

Teacher could pull up these instructions on a projector and have groups follow along or set up individually.

Students will build circuits and explore how electric current flows and communicate with the computer by playing sounds. They can use common objects, sensors and LED lights to create different circuits. (70 minutes or teacher discretion)

Post Assessment: Teacher led formative assessment, can be verbal or ask students to write down their responses.

- How did you get your circuits to work?
- What controlled the flow of electricity?
- What problems did you have and how did you solve them?

- What other things could you do/build with this knowledge?
- What variables can you change to affect the circuit?

(5-10 min)

Assessment

Pre assessment

- How does electricity work?
- What is a resistor?
- In what direction does current flow from a voltage source?
- How can you troubleshoot a circuit if it is not working?

Post assessment

- How did you get your circuits to work?
- What controlled the flow of electricity?
- What problems did you have and how did you solve them?
- What other things could you do/build with this knowledge?
- What variables can you change to affect the circuit?

Critical Vocabulary

Circuit- the complete path that an electric current travels along

Resistor- a device that is used to control the flow of electricity in an electric circuit

Voltage- the force of an electrical current that is measured in volts

Current- flow of electric charge

Electrical Power- the rate at which electric energy is transferred in an electrical circuit

Sensor- a device that detects or measures a physical property and records, indicates, or otherwise responds to it.

Author Information

Caleb Zander:

- Broughton High, Wake County, Raleigh
- Science 9-12
- 2 years experience
- Czander2@wcpss.net

Mentor: Dr. Jess Jur

- NCSU College of Textiles
- Dr. Jur researches materials and processing methods for nanoscale inorganic integration with polymer-based materials.
- Post Doctoral Associate - Material Science and Engineering
- PHD - Material Science and Engineering
- M.S. - Chemical Engineering
- B.S. - Chemical Engineering
- Email - jsjur@ncsu.edu

Mentor: Dr. Elena Veety

- NCSU Department of Electrical and Computer Engineering
- The department researches, generates, and publishes knowledge of computer and electrical engineering.
- enicole@ncsu.edu