

THE POWER TO CONDUCT #GOTTHEPOWER

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WHAT?

Participants will apply knowledge of completing circuits to explore conductors and insulators. They will learn what a circuit needs to function including how to place the materials. By the end of the lesson they will know which materials are conductors and which are insulators. They will also understand how to operate a Makey Makey and how to play Tetris, PacMan, Mario Kart, Panik, Frogger, and online instruments.

Making Objective: The maker will choose proper conducting materials that complete a circuit using a Makey Makey. This activity supports exploration, play, and teamwork. The maker is participating in the last three parts of the maker movement model: ideate, prototype, and test.

Materials/Resources:

- Makey Makey kit (found at <http://www.makeymakey.com>)
- Variety of kitchen utensils that include different sizes, shapes, and materials
- A list of games that you would like to play (anything using the arrow keys on a keyboard, spacebar, or click) <http://makeymakey.com/apps/>
 - Tetris (<http://www.freetetris.org/game.php>)
 - PacMan (<http://www.freepacman.org/>)
 - Frogger <http://www.froggerclassic.appspot.com/>
 - Panik for Bubble Trouble (<http://www.learn4good.com/games/bubble-shooter/arrowkeys.htm>)
 - Mario Kart Extreme: (<http://www.freeonlinegames.net/game/mario-kart-xtreme.html>)
 - Musical Instruments: <http://makeymakey.com/piano/>

<https://scratch.mit.edu/projects/106137514/>

<http://makeymakey.com/bongos/>

- Variety of food: fruits (apple, banana) and candy
- Other materials such as socks, pipe cleaners, or play dough
- Napkins
- Computer with USB drive
- Copper tape
- Paper/construction; paper/poster board
- Post it Notes
- Markers

HOW?

Directions:

1. Turn on computers and connect them to the big screens using the Dongle cords.
2. Tape 3 pieces of construction paper together to form one large piece. Use about 24 inches of copper tape and tape across the middle of the construction paper horizontally.

3. In the center of the copper tape that's already placed on the construction paper, add another piece of copper tape vertically. This will form a "T" shape, where one end is touching the horizontal copper tape and the other meets the edge of the construction paper.
4. Using a marker write, "Place one finger on the copper tape at all times" on the construction paper.
5. Open the Makey Makey kits and plug the USB cord into the control panel and the laptop computer.
6. Choose one alligator clip to attach to the metal part below "Earth" on the control panel and connect the other clip to the piece of copper tape at the top of the construction paper.
7. Choose another alligator clip to attach to the two holes side by side in one location on the panel, for example: the spacebar circle.
8. Repeat step 7 with five more of the alligator clips so all functions are accounted for.

Differentiation of stations:

Station 1: The maker will be introduced to what a Makey Makey is by observing a completed circuit. Each alligator clip will be pressed into a piece of play dough so the circuit is complete to play the instruments.

Station 2: Spread out various materials (fruit, candy, objects, etc.) around the station. Makers will choose what objects to use to try to complete the circuit. The maker will then write on post-it notes objects that worked (meaning they were conductive) and objects that did not work (meaning they are insulators).

Station 3 and 4: At the beginning, the Makey Makey's will be out with conducting materials around them, but no alligator clips will be connected. Older makers may read the reminders and complete the circuit to play their choice of games.

- When makers enter they can choose a station to go to. Younger makers may opt to play the instruments at the first two.
- Have conversations with makers at stations one and two asking questions like: "What do you notice about the circuit? What works? What doesn't work? Why not?"
 - This guides them to understanding conductors and insulators
- Maker Outline: Enter→Explore→Make→Play

WHY?

Brief description: Makers will explore conductors and insulators. We want participants to apply their prior knowledge of circuits and challenge them to think more deeply about what materials are conductors and insulators.

Rationale:

- Humans are goal oriented and actively seek information (Bransford, Brown, and Cocking 2000), therefore they will want to find a conductor to complete the circuit in order to play the desired game.
- "Constructivist theory: teachers should never tell students anything directly but allow them to construct knowledge themselves" (2000).
- We are letting the makers explore and create rather than providing direct instruction. This embodies the idea, "learning by constructing knowledge through the act of making something shareable." (Halverson and Sheridan 2014).

Bransford, J., Brown, A.L. & Cocking, R. R. (2000). How people learn: Brain, mind, experience and school. Washington, D.C.: National Academy Press. Retrieved from <http://www.nap.edu/openbook.php?isbn=0309070368>

Halverson, E. R., & Sheridan, K. M. (2014). The maker movement in education. *Harvard Educational Review*, 84(4), 495-504. Retrieved from <http://ezproxy.msu.edu.proxy1.cl.msu.edu/login?url=http://search.proquest.com.proxy1.cl.msu.edu/docview/1651843463?accountid=12598>