Super Summer class - Engineering 0.101

This class teaches students basic engineering concepts and techniques. Students start with a safety training day and then move on to take apart various electronic devices such as computers, VCRs, cameras, and cell phones. By the end of the class, students will have learned more about what makes these devices work.

Suggested Materials

- Tools (one per two students)
    - Screwdrivers
    - Wire cutters
    - Wrenches
    - Pliers
    - Crowbar
    - Etc.
- Safety Glasses
- Items to take apart
    - Old phones
    - Keyboards
    - Mice
    - VCRs
    - Radios
    - Old laptops
    - Old computers
    - Printers
    - Toasters
    - Record players
    - Speakers
    - Cameras
    - Etc.
- Power Sources (for testing the item taken apart)
- Request a laptop cart and projector
- At least one personal laptop
- Nametags

Impact

Through planning and teaching this two-week course, Team Neutrino was able to educate roughly 30 elementary-middle school students in basic engineering through a summer camp that emphasized the deconstruction of everyday household appliances.

Comments/Suggestions

The program works best if students are broken into pairs to take apart the appliances, and if there is a student mentor to monitor every group. For bigger appliances, student groups can be combined.

Daily Schedule

This was Team Neutrino's schedule when we taught the class in 2015. Each session was an hour and a half long.

	Goals
Day 1: Monday	Introduction Safety Lesson Take apart small item (Tuner) Lesson on Circuit Boards Watch Deconstructed
Day 2: Tuesday	Take apart an item (Cellphone) Watch Deconstructed Take apart a different Item (Speakers)
Day 3: Wednesday	Take apart an item (Mouse) Watch Deconstructed Take apart a different Item (Keyboard)
Day 4: Thursday	Take apart an item (Radio) Watch Deconstructed Take apart a different Item (Camera)
Day 5: Friday	Take apart an item (Printer) Watch Deconstructed Take apart a different Item (Scanner)
Day 6: Monday	Take apart an item (Cassette Player) Watch Deconstructed Take apart a different Item (Record Player)
Day 7: Tuesday	Take apart an item (Toaster) Watch Deconstructed Take apart a different Item (Space Heater)

Day 8: Wednesday	Take apart an item (VCR) Watch Deconstructed Team Neutrino robot demonstration Take apart a different Item (Boombox)
Day 9: Thursday	Take apart an item (Computer) Watch Deconstructed Take apart a different Item (Laptop)
Day 10: Friday	Exhibition Day!

Day 1: Monday

June 1, 2015

Preparation

- Collect all the donated appliances/electronics into a classroom and sort them. (put appliances that are alike together)
- Acquire access tools and make sure there are enough for all the children.
- Bring enough pencils, name tags, and safety glasses for everyone.
- Get access to a computer, speakers, and a projector.

Lesson Plan

1. Welcome, introductions, and icebreaker activity
    a. **Option 1** (no extra materials/prep needed)
    I never: Everyone sits in a circle of chairs with one person in the middle. The person in the middle is "it" and introduces themself and says something he/she's never done. Ex: "I'm Tianxin and I've never taken apart a toaster." Then, everyone who has done that has to get up and find a new seat in the circle, with the person in the middle also trying to find a seat. The person in the end without a seat is "it" for the next round.
    b. **Option 2** (minimal)
    Let the teacher introduce themselves. Then go around the room and get all the student and volunteers to say their names and what grade they are going into.
2. Overview of the session - *what will we be doing for the next 2 weeks?*
3. Safety Lesson, tell the kids what they can and cannot do. Example: We can't take apart a TV safely with the equipment we have because it has a cathode ray tube.
4. Get all kids to put on safety glasses.

5. Take apart a small item, maybe a guitar tuner. (Give a tuner to a group of two students, and have a volunteer monitor them as the tuner is taken apart)
6. Explain the basics of a circuit board and what is on the circuit board.
7. Watch a segment of Deconstructed to further the kids understanding of how things work.

Day 2: Tuesday

June 2, 2015

Preparation

- Decide what appliance/electronic is going to be taken apart.
- Divide up the appliances or electronics that are going to be taken apart that day into two groups for the different sessions.
- Make sure that none of the tools have been lost.

Lesson Plan

1. Divide kids into the groups of by where they are sitting in the room.
2. Overview of today's goals
3. Get all kids to put on safety glasses.
4. Figure out the group to pick the first appliance by: picking a number between 1-50, then make all groups choose a number. The group that is the closest to the chosen number gets to pick the first appliance.
    a. If there is a bigger appliance or electronic combine a few groups together to create a large enough group to take apart the hole appliance.
5. Let the kids take apart the appliance, use a power source to get gears to move or LEDs to light up.
6. Have the kids walk around and see all the items that have been taken apart. Let them try to identify some of the components in the appliances
7. Clean up.
8. Watch an episode of Deconstructed.
9. Take apart another appliance and then clean up for the day.

Days 3-10

Follow the outline for day 2, but substitute new appliances for each day. Deconstructed was a TV show that aired in 2008 on the Science Channel.