



Lighthouse Community Public Schools

in collaboration with

Maker Ed

Maker Promise

TAKE- APART

A Guide from the Creativity Lab

Author

Anna Milada Grossi

Contributor

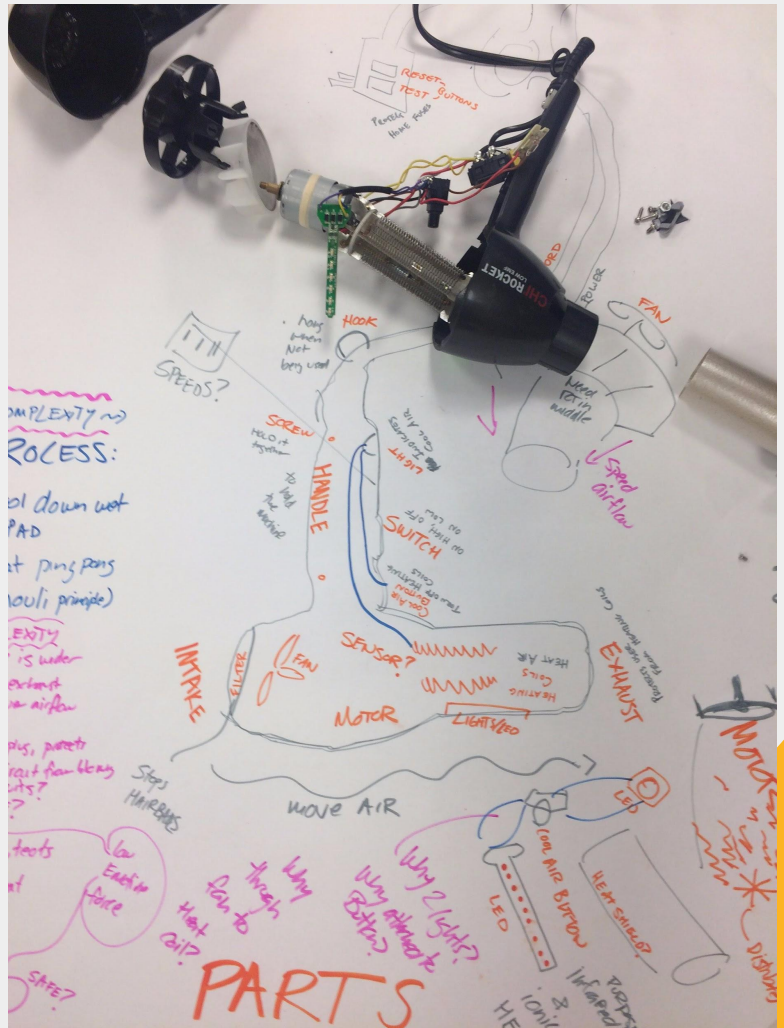
Claire Tiffany-Appleton

Based on

An activity from *The Tinkering Studio*
& *Thinking Routines* from *Agency by Design*

**Lighthouse Community
Public Schools**

444 Hegenberger Road
Oakland, CA 94621



www.lighthousecreativitylab.org

www.makered.org

About This Project

This activity is a take on a project first shown at the [Tinkering Studio](#), where people were asked to take apart broken mechanical toys.

This project is to prompt certain questions regarding everyday objects and appliances that are in our homes. Taking apart, dissecting and deconstructing is a scientific approach to analysing the design of everyday objects that we would normally overlook. Many times during this activity people have been amazed and surprised at the inner workings of an item, either for its logical simplicity or intricate complexity. When facilitating this project we usually introduce Agency by Design Thinking Routines (this activity was designed in collaboration with educators and researchers at Agency By Design, a research initiative at Harvard's Project Zero) such as [Parts Purposes Complexities](#) or [Parts People Interactions](#) (we will go into detail later on in this guide).

This activity is affordable and sustainable, as it mostly involves taking apart broken and/or unused items. If toys are being dissected, the parts can be re-used to create a new toy!

Our Story

This project was first introduced to us by The Tinkering Studio. We have adapted it to different classes and have facilitated it during some of our Professional Development workshops.

Our Middle School Making Teacher, Ms. Dobras, most recently had an 8th grade class do a "Take-Apart" over the course of two classes. In the first class the students individually took apart a retractable pen and analysed the parts, purposes and complexities. In the second class, they did the same activity in groups but with a larger item (drills, telephones, hair dryers etc). This guide is for the 2-class project from our Making course.

Materials & Tools

MATERIALS

- Butcher Paper
- Markers
- Pens to take apart
- Electronics to Take Apart
- Card Stock
- Cardboard

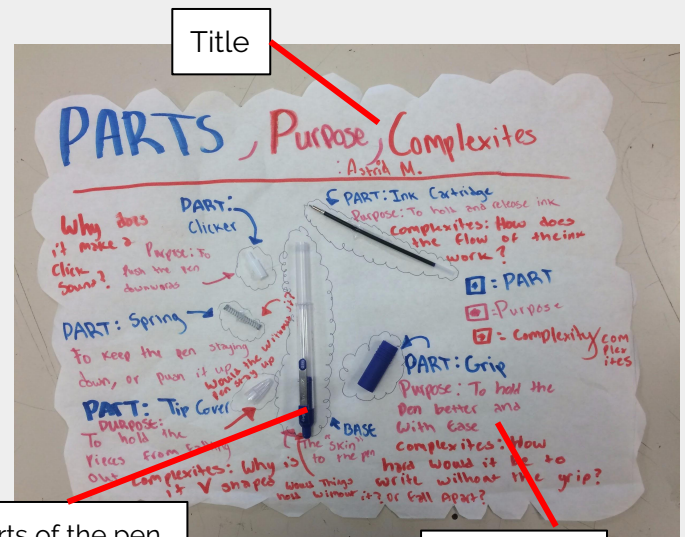
TOOLS

- Screwdriver
- Drill
- Safety Goggles
- Gloves (optional)
- Scissors
- Tweezers
- Cutting Mats

Learning Targets

- I can look closely.
- I can explore complexity.
- I can document a system.

TIME: 2 class periods of 40 minutes



Parts of the pen

Reflections

Context: Before we make...

Taking apart an everyday item encourages reflection on overlooked designs and prompts questions about how and why things are made in a certain way. It is always surprising to make the mechanics and motions of an appliance visible; dissecting the parts make them seem more accessible and “tinkerable”.

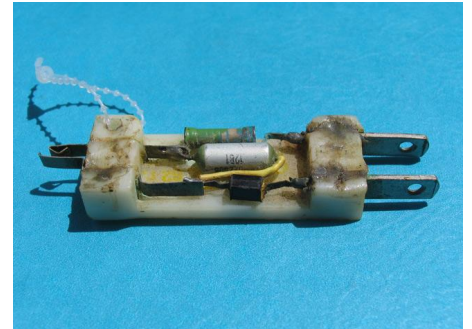
Artist **Todd McLellan** published a series that explores the inner workings of items that are in our everyday lives. **Agency by Design**, a research project from Project Zero, has compiled a guide on Take-Apart following their Thinking Routines. Finally, Cuban artist **Ernesto Oroza** has documented the inventions of his country (Cuba), where a widespread DIY culture took place. Taking apart objects and repurposing items became the norm on the island and gave birth to a generation of inventors, hackers and engineers.



[Todd McLellan](#)



[Agency by Design Take Apart](#)



[Technological Disobedience](#)

Material Management

Broken and recycled electronics can be found at local thrift shops and swaps, and are usually very inexpensive. You can also arrange to have items dropped off in your class by peers and parents. For the first exercise with the pen, create small “kits” on each group table so every student has a pen to take-apart and the necessary tools. Lay butcher paper on the entire table for annotating and reflecting.

Taking apart a bigger appliance can be done in pairs or groups of 3-4 people, and cardboard sheets can be used to display the components or create a new composition of the objects.

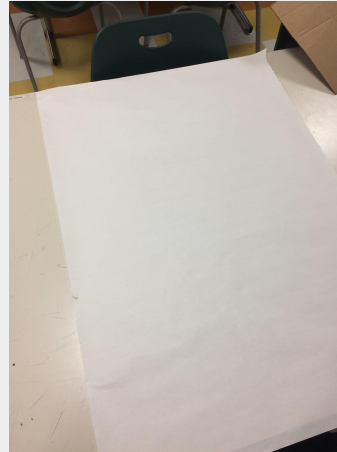
When the activity is over, keep any usable motors and parts from mechanical toys, etc. They can be used to create unique circuit blocks or frankenstein creations.

How to Introduce New Tools & Tech SAFELY

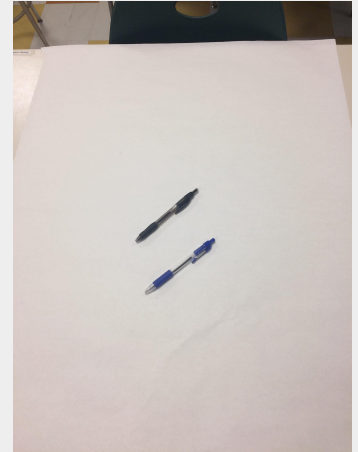
- Be careful when using hot glue guns
- Use safety goggles and possibly gloves when taking apart bigger appliances (some items have lubricant around gears and motors)
- Students should be able to figure out which tools to use when taking apart an object. Have smaller ones (screwdrivers, scissors, wire-cutters) readily accessible, and be ready to advise on the use of bigger ones (drills, saws, etc.)

Step-By-Step Guide

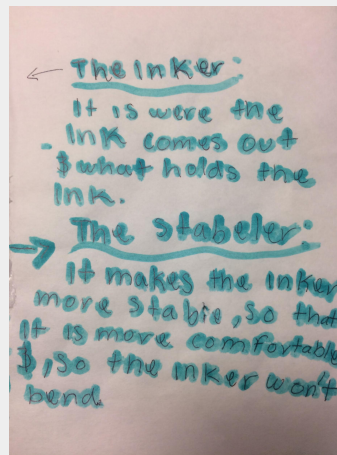
1. Cut butcher paper and place on tables.
2. Place pens on each table, one per student. Invite them to observe the pens closely, identifying each part, without taking them apart.
3. Have students write initial observations about the pens on the butcher paper.
4. Separate the parts! Have the students take the pen apart. Be careful not to lose any small bits.
5. Hot glue the parts to the poster. Leave enough space next to/around them to annotate.
6. Write the final reflections about Parts, Purposes and Complexities for each part on the butcher paper. The students can follow a template provided, or can organise the prompts on their own. Encourage the use of drawings, maps, lists, in order to develop visual thinking. The paper can then be cut from the table and glued onto a sturdier surface (like cardboard or foam board).



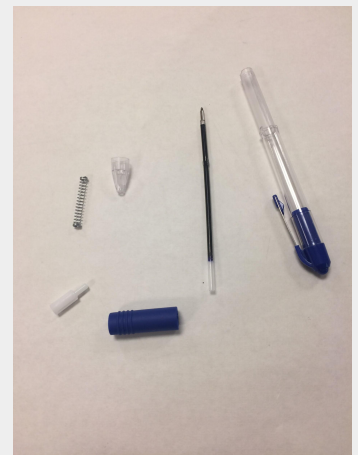
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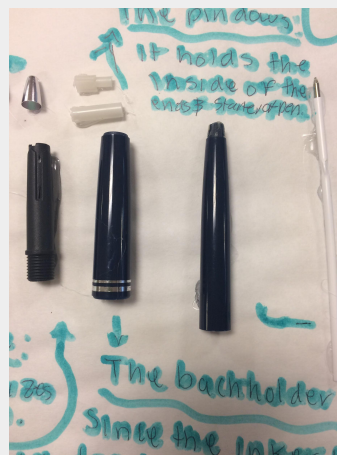
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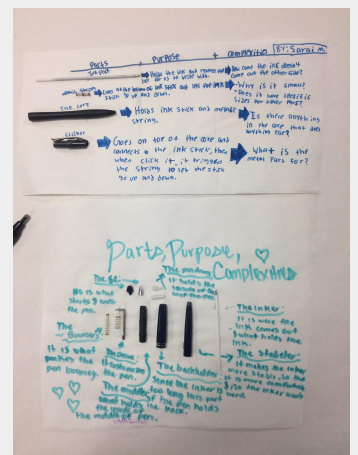
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4.



5.



6.

Take-Apart with Older Students

The same activity was proposed to our High School students, who took apart slightly more complex electronic items such as drills, saws, keyboards and household appliances. As with Middle School, you can arrange a drop-off of these items for your class, or alternatively look at thrift-shops and recycling centers.

Challenge students to see how deep they can go regarding the parts, purposes and complexities of the items, and encourage them to take it "a step further". You can decide whether you want to provide background information or not regarding the item (i.e. who invented it, when was it first made, and other information not readily available from just observing it).

Additionally, classes can collect all moving parts from their take aparts and transform them into circuit blocks.

Inquiry Model

This activity is based on Agency by Design's Thinking Routine [Parts, Purposes, Complexities](#). Thinking Routines were devised to encourage "design" dispositions and behaviours that are applicable to different subjects and classes.

Parts, Purposes and Complexities helps the students to slow down and make detailed observations about everyday objects (or systems). It helps with reflection and creates opportunities to show visual thinking through maps, drawings, lists.

PARTS, PURPOSES, COMPLEXITIES *LOOKING CLOSELY*



Looking Closely

As mentioned earlier, decide whether you want to provide students with background information about the object that isn't readily deducible from its observation. Maybe from the activity students can come up with their own ideas on who invented it, when and where it was made. Have them understand how the form and materials dictate the function and purpose.

We observed that often the "complexities" part of the Thinking Routine is the most difficult to complete, and students often feel like they are failing a part of the exercise by not fully understanding the complexities of the object. You can rephrase this part as "questions" and have students write down doubts and questions they might have. These questions can spark an in-class discussion.