How Does a Computer Work: Processing Information

TOPIC: BASIC KNOWLEDGE OF COMPUTING SYSTEMS (HARDWARE/SOFTWARE)

GRADES: K-2, 3-5

LESSON DURATION: 45 MINUTES

SOFT SKILLS: COMMUNICATION, PROBLEM SOLVING, COLLABORATION (VIA EXTENSION ACTIVITY)

Learning Outcomes:

- Students will identify the major components for processing and storage for a computing device.
- Students will complete a mini-simulation on the ways in which a computer processes information.

Materials:

- An old computer for visual display (or pictures)
- Inside Your Computer | Bettina Bair | For more TED-Ed, visit ed.ted.com.

Activities:

1. The teacher should explain that today students will learn how a computer stores information by examining different parts of the computer. A simple review of hardware and software could occur at the start of the activity.
2. The teacher should ask students to name different ways that a computer can store information - they may be able to name many of these: Floppy Drive, Hard Drive, CD/DVD, USB, Solid State Drive (SSD). Students may mention the cloud but redirect them to storage on the device itself
3. It would be best to have physical examples of each for the students to handle. Open up the Floppy to show them the actual floppy inside the disk, open the hard drive to show the disk that spins inside, open the USB to see the tiny chip, explain the SSD is similar (these are too expensive to open unless you have a dead one already).
4. Don't do cloud yet! That is a completely different way of storing info and cloud isn't a device component.
5. Teacher should then give the students an analogy - when humans want to use food for energy, what happens once we input the food through our mouths? Discuss the simple steps of what happens to food and how it is processed. Again visuals help best with this.
6. The teacher can then explain that now we are going to look at how computers process information. The teacher can walk through how info (data) comes in through the keyboard - goes to ram - then the processor does something with it - then goes back to ram - then result goes to monitor or printer so that we can see it. The teacher may choose to use the TEDEd lesson entitled: Inside your Computer by Bettina Bair.

7. Hands on activity: The teacher can then lead an activity in which each student plays one of these roles for the computer to do a math problem. The students, working together can take a problem and get it through each step as described above by acting the roles of the computer parts. For example, one student will develop the math problem. The next will input it into the keyboard (write it down on paper to represent the keyboard). The next student, acting as the RAM, receives the piece of paper, then passes it onto the processor who will solve the problem. That student then passes the paper with the solution back to the RAM. The RAM hands it to the student identified as the monitor/screen. The monitor hands it back to the original student who developed the problem. He/she checks to make sure it is correct. If correct, that student then hands it to the printer. If incorrect, he/she needs to send it back through the entire process again. All of this only works if the computer has the proper operating system and/or software installed on it. The hardware can only perform the tasks if the software is operable.
8. This activity can serve as a reteaching or review of input/output components and hardware/ software.

Enrichment/Follow-up:

• After the activity, ask students to think about any problems that occurred. What sorts of things could go wrong within a computer. This discussion could be done at a very basic level but could introduce the students to the concepts of viruses and malware. Both viruses and malware could cause there to be issues in the way the software performs. In order to keep the machines healthy, antivirus software, updates, and patches should be performed on a routine basis. Students should also be aware of their online activity-they should avoid clicking on links, advertisements, etc that may contain malware.