0 - Introductory Lesson

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This lesson marks the first step in our journey to making a website. Besides getting to know one another, partipants will disassemble a computer to get a hands-on, bird's eye view of hardware. Then by discussing abstractions in computer science, this lesson will cover software and its relationship to hardware. This provides participants with a general foundation about computers that will be expanded upon over the course of the workshop.

Overview

Lesson Objectives

By the end of the lesson, students will be able to:

- Identify and describe the function of common computer components,
- Articulate a working definition of abstraction (in the context of computer science).

Materials

Here's what you'll need to run this lesson:

- lesson slides;
  `https://www.computing-workshop.com/lesson/pdfs/0-slides.pdf`
- ice breaker activity, 1 copy per group;
  `https://www.computing-workshop.com/lesson/pdfs/0-icebreaker.pdf`
- name tags for participants;
- blank paper and colouring supplies;
- computer disassembly worksheet, 1 copy per group;
  `https://www.computing-workshop.com/lesson/pdfs/0-cpu-disassembly.pdf`
- computers for disassembly and tools for disassembly, ideally 1 computer for 4 students;
- abstraction activity worksheet, 1 copy per group; and
  `https://www.computing-workshop.com/lesson/pdfs/0-abstraction-activity.pdf`
- abstraction notes worksheet, 1 per person.
  `https://www.computing-workshop.com/lesson/pdfs/0-abstraction-notes.pdf`

Instructional Sequence

10 minutes Introduce course website, explain navigation of the website, introduce syllabus, introduce facilitators.

25 mins. Assign students to groups of four, getting them them to complete the icebreaker activity worksheet. They will have 15 minutes to prepare and 2 minutes per group to present their groups. At the end of the session be sure to preserve the group banners.

20 mins. Present groups with the computer they will disassembly, the tools to disassemble, and the worksheet they are to fill out. Circulate amongst the groups to ensure they're on the right track. If they need help finding online resources, direct them to the resources tab of the workshop website.

10 mins. Get the partipants to describe the function of each computer component they removed from their computer; each group should present at least 1 component.

10 mins. Using the slide materials, facilitators will use direct instruction to briefly explain how computer chips are made and function. Without getting into the production details, participants should understand that chips store and process data in binary.

20 mins. Using the anology of drawing to first introduce students to the concept of abstraction by asking one student to come up to the board to draw a square. Upon completing the square, ask the participant how they know how to draw a square. Their answer demonstrates how one associates more complicate processes under one words like square; this is abstraction. Here is an example as to how the conversation might unfold during a session.

FACILITATOR: To best understand abstraction, we are going to apply the concept of abstraction to drawing. Can a volunteer come up to the board to draw a square?

PARTICIPANT: I volunteer!

[*Participant comes to the board and draws a square*]

FAC.: Thank you. Now, how do you know what a square is?

PAR.: Well I know a square is like a rectangle except with equally long sides.

FAC.: This is true, and already we have an abstraction. Can someone identify where our friend used abstraction?

PAR. 2: They used the word "square" to describe a square as a rectangle with equally long sides. They replace the definition of the square with just the word square.

FAC.: Yes, percisely. Square is an abstraction.

Moving on, emphasis the 2 main uses of abstraction: easy of use and composability. To describe composability, continue using the drawing anology to describe how multiple abstractions can be built up into one abstraction.

FACILITATOR: Now that we have a working defintion of a square, let's suppose we really just want to draw a house. Assuming we already defined a triangle, let's say a house is a triangle on a square.

[*Facilitator draws a square and triangle to looks like a house*]

FAC.: This here is another level of abstraction; square plus triangle equals house. We can continue to use abstractions to further develop our drawing. Let's assume a village is a group of houses close together.

[*Facilitator draws a group of houses, all made from triangles built atop squares*]

Connect the drawing analogy back to the realm of computers, emphasizing how abstraction allows us to make powerful and efficient programs and commands.

FACILITATOR: We are able to created new abstractions by combining different abstractions. By combining abstractions like square, triangle, and house, we were able to come to villages. This same theory applies to not what makes programming so powerful but also can describe a way to categorize all the different levels of a computer, from Minecraft to circuits.

20 mins. Using slides matierals, provide a rudimentary definition of computers and their use of abstraction using the ”ladder of abstraction”. Afterwards, distribute the abstraction worksheet and assign each group a level of abstraction for them to reserach and teach to the rest of the class.

5 mins. Conclude class with review of what was covered and what will be covered next class.