Lesson 6: Processing

Overview

Question of the Day: What are the different ways computers can process information?

This lesson introduces students to four common types of processing: if/then (conditionals), finding a match (searching), counting, and comparing. Students are first introduced to the types of processing through several sample apps. They then investigate more apps to determine what sorts of processing each uses. They then think of their own app and decide what types of processing it would need to work. Finally, they brainstorm other types of processing that may be useful but were not included in the main lesson.

Purpose

This lesson introduces the concept of processing within computational problem solving. The definition of processing presented in this lesson is intentionally approachable. Students should understand that processing is whatever a computer does to turn inputs to outputs, and that there are many different ways for computers to do this work. The goal of this lesson is not for students to write specific algorithms for the example apps.

Assessment Opportunities

1. **Determine possible processing used to perform common computing tasks**

   In the wrap-up discussion, make sure that students come up with multiple examples of processing and are able to explain how that processing turns input into outpput. You might also collect individual answers to this question as an exit ticket.

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

- ▶ **AP** - Algorithms & Programming
- ▶ **CS** - Computing Systems

Agenda

Objectives

Students will be able to:

- Define processing as the work done (possibly by a computer) to turn an input into an output
- Determine which types of processing are appropriate for a particular computing problem.
- Identify several common types of processing used in computing.

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **CSD Unit 1 - Problem Solving and Computing** - Slides

For the students

- **Apps with Processing** - Activity Guide

Vocabulary

- **Processing** - The thinking work computers do to turn input into output.

Teaching Guide

Lesson Modifications

 **Attention, teachers!** If you are teaching virtually or in a socially-distanced classroom, please **click here** to access modifications that can be used during this lesson.

Warm Up (5 minutes)

Analyzing an App (Birthday App)

Journal Prompt: Go on Code Studio to try out the birthday app. It has three possible outputs. Try to find each one.

1. What is the input to the app?
2. What is the output?
3. How do you think the app decides which output to give back to the user?

1 **App: Is It Your Birthday?**

Circulate: The first part of this reflection serves as a review of input and output. As students reflect on the prompt, check their answers to ensure that they understand how input and output are used in the app.

Content Corner

Students may identify the user's birthdate as one input and possibly the current date as another input. The message of whether or not it is the birthday is the output. The decision of which message to output is based on whether the current date matches the date that the user inputs.

Ask students to share out how they thought the app made the decision.

Discussion Goal

Students may have trouble articulating exactly how the app makes its decision. Encourage discussion and highlight the "matching" and "if/then" facets of the decision make process. (e.g. "The app **compares** the birthdate to today's date." / **If** the birthdate is the same as today's date, **then** display "Happy Birthday!")

Remarks

> In the past few lessons, we learned that computers are machines that help us with thinking work by turning input into output. For example, the thinking work this app did was to compare the birthdate to today's date, and to use that information to decide what to display on the screen. These types of thinking work computers do are called "processing." We are going to look at some different types of processing today.

Key Vocabulary:

- **Processing** - the thinking work computers do to turn input into output

Question of the Day: What are the different ways computers can process information?

Activity (35 minutes)

Types of Processing

Remarks

> We've already seen two different types of processing in the Birthday App: comparing and if/then. We're going to look at a couple other apps and see what kinds of processing they might use.

Display: Demonstrate the "National Park " app at the front of the room, or allow students to explore the app on their own.

2 **App: National Parks**

Prompt: How does this app use if/then and comparing to turn the input into output?

Discussion Goal

Allow students to share out their answers, and reinforce that comparing can mean deciding whether any two things are the same, not just numbers.

Display: Demonstrate the "How Many Countries..." app at the front of the room, or allow students to explore the app on their own.

3 **App: How Many Countries**

Prompt: This app uses some different types of processing to make decisions. What kinds of processing might it use?

Discussion Goal

Allow students to share out their answers, but make sure that the "counting" and the "find a match" are highlighted in the discussion.

Remarks

> There are lots of different types of processing that computers can use. Today, we are going to focus on four basic types: If/then, comparing, finding a match, and counting.

Display: Display the four types of processing and their definitions at the front of the room, and review the information with the students.

Group: Put students in groups of 2-3. Each group will need access to one computer for this activity.

Distribute: Give each group one copy of the activity guide.

Apps and Processing

As a class, complete the first three rows of the activity guide, which reference the three apps that students have already seen.

Circulate: Allow students to complete the rest of the chart in their groups. As they fill out the charts, ask them to elaborate on how the app works and what makes that particular type of processing useful.

Assessment Opportunity

Because almost all apps use more than one form of processing, students may identify unexpected aspects of the apps. The most important part is their explanation. They should be reasoning about how the input is used to generate the output of the app.

My Famous Birthday

This app asks users to input their birthday, then tells them the day of the week that they are born and a famous author born on that same day. The type of processing is included in the "teacher only" notes in the level.

4 **App: My Famous Birthday**

Stamp Notebook

This app allows users to click on an icon and "stamp" that icon on the display screen. Clicking an icon more than once changes the color of the stamp.

5 **App: Stamp Notebook**

More Processing

The next chart asks students to find two types of processing for every app. The explanations for processing are included in the For Teachers Only section in Code Studio. This section asks students to evaluate more complex apps, which may be difficult for younger students. Feel free to skip this more challenging section and move directly to the "student app" section.

The Fastest Finger

This app displays which key is being pressed the fastest, the 's' key or the 'k' key.

Guess the Number

This app asks users to guess a number between one and one hundred, and displays whether the guess is too high, too low, or correct.

Where Should I Live?

This app gives the user advice on where to live based on the answers to a few questions.

6 **App: The Fastest Finger**

7 **App: Guess the Number**

8 **App: Where Should I Live?**

Student Apps

Students come up with their own app ideas, using their previous app from the Inputs and Outputs lesson, or coming up with a new one. They then think of the types of processing that would be needed for those apps.

Share: Allow students to present their app ideas and the processing that they would need.

Wrap Up (5 minutes)

What Inputs and Outputs Do I Use?

Prompt: We saw four different types of processing today, but there are many more.

1. What's another type of processing that you think would be useful?
2. What kind of app might use it?

Circulate: Have students brainstorm individually and record their ideas on their activity guides or journals.

Discuss: As a class, discuss the examples students brainstormed.

Assessment Opportunity

Students' answers will vary, but make sure that they are reasonably using processing to change an input into an output.