

Lesson 9: Problem Solving With Data

45 minutes

Overview

In this lesson, students use the problem solving process from earlier in the course to solve a data problem. After reviewing the process, the class is presented with a decision: whether a city should build a library, pet shelter, or fire department. Students work in teams to collect information on the Internet to help them decide what should be built, then use this information to build an argument that will convince the city council of their choice. They then map what they have done to the problem solving process that they have been using throughout the course, comparing the general problem solving process to its specific application to data problems.

Question of the Day: How can we use data to solve problems in our community?

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

► DA - Data & Analysis

Agenda

Warm up (5 minutes)

Activity (35 minutes)

Define

Prepare

Try

Reflect

Wrap Up (5 minutes)

Objectives

Students will be able to:

- Identify and collect relevant data to help solve a problem.
- Use data to draw conclusions.
- Use the problem solving process to answer a question using data.

Preparation

- Check the "[Teacher's Lounge](#)" forum for verified teachers to find additional strategies or resources shared by fellow teachers
- If you are teaching virtually, consider checking our [Virtual Lesson Modifications](#)

Links

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

For the teachers

- [Problem Solving With Data](#) - Slides
▼ Make a Copy

For the students

- [Problem Solving with Data](#) - Activity Guide
▼ Make a Copy

Teaching Guide

Warm up (5 minutes)

🎤 *Remarks*

In the first half of this unit, we talked about different types of data, or information, that are stored on the computer. Now we're going to look at how we use data to solve different problems.

Prompt In your journal, when was the last time that you looked for information on the Internet? Why did you need it?

Discuss: Have students journal individually, then share with a neighbor, and finally discuss as a whole class.

Discussion Goal: The goal of this discussion is for students to realize that they use the Internet as an information resource to help them solve problems in their own lives. As the students brainstorm why they go online, encourage them to frame their information search as one step in problem-solving.

Remarks

All of these things are data, and they all helped us to solve a problem in our lives. Today, we're going to look at our problem solving process and how it can be used together with data.

Question of the Day: How can we use data to solve problems in our community?

Activity (35 minutes)

Introduce students to the scenario they will encounter in in the activity guide. You should aim to choose a location in your city or town that your students will be familiar with. If this isn't possible, you can use an example location such as the Columbia Mall in Columbia, Missouri (MO).

Remarks

For this activity, we're going to be experts hired to give advice on what they should build in a new location by the local mall. The city has the money to build something nearby, but the council can't agree on what the city needs most. Some members want a fire station, others want an animal shelter, and others want a library. Our job is to research data and use the problem solving process to help us make a convincing recommendation to the council. We will use the Problem Solving Process to solve this problem.

The Problem Solving Process: Introduce students to the Problem Solving Process - a structured process used to break a problem down into manageable steps:

- **Define:** understand the problem, your constraints, and defining what success looks like
- **Prepare:** brainstorm/research possible solutions, compare pros and cons, and make a plan
- **Try:** put your plan into action
- **Reflect:** reflect on your results compared to the goals set, reflect on what you can learn from this or do better next time, and identify any new problems you have discovered

Students will use this process to solve today's problem.

Teaching Tip

Already Familiar with the Problem Solving Process: If students are already familiar with the Problem Solving Process from previous units, you can choose to simply remind your students of the four steps - *Define*, *Prepare*, *Try*, and *Reflect* and let them know they will be using this process to solve problems moving forward.

Group: Put students into groups of 3-4

Distribute: Distribute copies of **Problem Solving with Data**, one per student.

Solving a Data Problem

Define

Prompt: What is the problem you are trying to solve? Ask students to write down the problem in their activity guide, then allow them to discuss with a partner.

Allow students to share out their responses and discuss them as a class.

Discussion Goal: Students should understand that it's not just about having an opinion about what should be built, but using data to help decide what the city needs most.

Prepare

Prompt: What data do you need to solve your problem? Write down three types of data that might help you to decide what the city needs the most. In a moment, you'll be sharing these ideas with a group and deciding which ones to investigate.

Circulate: Give students a few minutes to complete this individually, then ask students to share their ideas with 2-3 other classmates in small groups. Encourage groups to continue adding types of data to their list as they get more ideas from their classmates.

Teaching Tip

If students are having trouble coming up with relevant data, you can try to lead them to some of the following:

- What libraries, fire stations, or animal shelters are in the area? (map sites, such as Google Maps)
- Are people happy with the existing services? (review sites, such as Yelp)
- How many people live in the city? How large is the city? (City web site, or Wikipedia)

Assessment Opportunity

You can check the first page of the Activity Guide to ensure that there is relevant data identified and recorded in the "Prepare" section.

Remarks

I heard some really great ideas - this is a lot of data! We may not be able to find it all, but we're going to split into groups and look for this data on the internet.

Circulate: Support groups as they try to locate the data online and record what they have found on the Activity Guide.

Share Out: Bring the class back together to share the data. Record the results of the research somewhere public and in front of the classroom so everyone can see. When this is finished, you should have a class list of facts and information that students can use to help make a decision.

Try

Discussion: Allow each group to discuss what they think should be at the location and fill out the chart with their reasons and data. Make sure students understand that they are allowed to use the data from the **whole class**, and not just that of their particular group. They should use at least two types of data to support their decision.

Circulate: Support groups as they decide what should be built at the location. If groups cannot come to an agreement, assure them that there is no "right" answer for this problem, but they should try to figure out what they can support with two types of data.

Share Out: Have groups share out their decisions, as well as the reasons and data that support them. Assure them that it's fine to have multiple answers, as long as data is being used to support their ideas.

Discussion Goal: Students should understand and be comfortable with the fact that the decisions that we make from data involve interpretation and prioritization. They should be able to support their decisions using the data the class found.

✓ Assessment Opportunity ▲

You can check page 2 of the Activity Guide to ensure the reasons justifying the student's choice are clearly related to the cited data.

Remarks

Even people with the same data can sometimes come to different conclusions. When you make a decision with data, you have to know what the data means and what is important to you.

Reflect

Ask students to fill out the last portion of the worksheet, reminding them that more data might help them make a better decision.

Wrap Up (5 minutes)

Journal: Ask students to think of a problem in their lives or community that they might be able to solve with data. They should answer the following three questions:

- What is the problem?
- What data could help you solve it?
- Where could you find that data?



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