Selection Sorting | Teaching Guide

Overview

This teacher-led activity (~30 minutes) teaches students the basics of the selection sort algorithm. It leads students through a discussion about real-life examples of algorithms. The worksheet then provides the step-by -step process of the selection sorting algorithm. It aims to expand students' understanding of programming and how computers can sort items.

Teaching Guide Sections

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Vocabulary

- **Algorithm** - A set of instructions that will always result in the same answer when given the same input. They are executed sequentially.
- **Running Time** - How long it takes for code to finish executing its steps.
- **Sorting Algorithm** - an algorithm that puts elements of a list in order. The order is usually numerically ascending. Ex: (1, 3, 12, 83, 100…)

Setup

Requirements:

Each student will need a copy of the printable worksheet and a copy of the cutout sheet from the “Printable Materials” section. They will also need a pencil, scissors, and glue for this activity. The printable worksheet is fine to be printed out double-sided, but the cutout sheet should be printed out single-sided.

The supplies listed above should be distributed after the class discussion.

Activity Instructions

1. Class discussion

The teacher will pose a few questions to the class, and have an open discussion, providing examples and letting students give answers of their own for a few minutes. The teacher can use the provided responses to provide information and segue into the activity, or go on their own.

The important part is to define an algorithm to the class, and guide them through a real-life example of how they use algorithms in their day-to-day life.

Provided Questions & Answers:

- Does anyone know what an algorithm is?
    - An algorithm is a set of instructions, or a list of steps, that you follow to get something done. They tell a computer what to do.
- Let’s go through an example: getting to school. What are some steps you follow?
    - Have the students raise their hands, listing steps. Stop when the last step is “walking into the school” or something similar.

    - Some steps might be: get out of bed, go to the bathroom, brush your teeth, get dressed/change out of pajamas, eat breakfast, brush hair, pack lunch, put shoes on, and drive to school.

- So this list is your algorithm for getting to school. Did you realize how many steps you do every day? Is it more than you thought?
    - This is just a general list, we could break it down even further, into a million steps. Like the “getting dressed” step can also be its own algorithm. You could write the steps for putting on each piece of clothing.
    - Today we are going to be learning about algorithms for sorting. I’m going to pass out some papers…

2. Selection Sorting - Small Group Activity

Distribute the printed activity and cutout sheets to each student, along with a pencil, scissors, and glue. Students should spend some time working on it and filling out the answers. This is the longest section of this activity, and where most of the time is spent.

They should work together in pairs or groups of three if it is difficult, and there is a provided answer sheet in the Printable Materials section for the teacher to look at and use to answer questions.

3. Wrap Up

The activity is over, so now the teacher can wrap up the activity. The teacher can use a few of the provided questions and responses, or can go on their own.

The important points of this part are to make sure students can now define an algorithm and describe the two different ways to sort that they learned on the worksheet.

Provided Questions & Answers:

- How about now? Raise your hand if you know what an algorithm is? What is it?

    - That's right, it is a set of instructions / list of steps! The algorithms we learned about today are some day-to-day algorithms you do, as well as a few different sorting algorithms.

- What are some other ways you might follow algorithms every day, like what we discussed at the start? What could be the steps?
    - If students cannot think of any, here are some others: cleaning your room, brushing your teeth, making breakfast, or doing homework.
- Did you like following the process to sort objects? Do you think the computer can follow these steps?
    - Students can share their thoughts on this sorting algorithm.

End of Activity.

Extra Resources

How to explain Algorithms to Kids:
https://www.tynker.com/blog/what-is-algorithms-for-kids/

Algorithms through doodles:
https://teachinglondoncomputing.files.wordpress.com/2016/07/algorithmdoodleart1v1.pdf

Example solution:
https://teachinglondoncomputing.files.wordpress.com/2016/07/algorithmdoodleart1v1.pdf

Learning Algorithms through Paper Airplanes:
https://code.org/curriculum/course2/2/Teacher

A teacher's video: https://www.youtube.com/watch?v=klAj43fK2mg

Instructions for Robots - unplugged activity:
http://www.allyouneediscode.eu/documents/12411/69843/Lesson+plan+3_+Introducing+the+basic+concept+of+algorithm.pdf/6ac633d7-72d5-46b1-b4fd-910446b23bb8

A teacher's video: https://www.youtube.com/watch?v=0eNSUHRKOzk

Learning Algorithms with Egg Cartons:
https://teachyourkidscode.com/egg-carton-unplugged-coding-activity/