3.1 Introduction to Computer Science

Summary

Students experience the necessity to give a computer an exact set of instructions. They become acquainted with the components of a computer.

Learning Objectives

After this class, students will be able to:

- Explain that computers follow their instructions (programs) exactly.
- Identify parts of a computer.
- Explain the difference between software and data.

Materials

- 2 – 3 Loaves of bread
- Jar of peanut butter (or tub of butter if there are peanut allergies)
- Jar of jam or jelly
- Paper plate
- Butter knife
- Computers with internet access

Time

80 minutes

Preparation

Students will be programming their main project for this unit in Scratch, but will be using some of the instruction at Code.org to learn the necessary parts of code. The students should complete these Code.org lessons at home, so they are ready to use what they have learned on the project during class. In order to track their progress on Code.org, you need to set up an account as a teacher and create a class. Go to https://studio.code.org/ and sign up as a Teacher. Once you have created an account, go to the Teacher Home Page. There you will find Student Accounts and Progress. Click on this link to create a course that your students will join. Follow the instructions on the site to create the course.

Procedure/Pacing

PB&J Instructions and Computer Coding

1. Without any prior discussion, ask class to individually write down instructions for how to make a peanut butter and jelly sandwich.
2. Briefly read through what the students have written and select 2 to 3 of the least detailed and precise instructions.
3. Follow these instructions EXACTLY. For example, if the instructions tell you to get a piece of bread, but do not tell you to untwist the tie, reach into the plastic bag through the opening with one hand, grasp a piece of bread, and remove it through the same opening; you should rip open the bread package to get the bread out. Use your imagination and be ridiculous when following the student instructions. The point to communicate here is that you (like a computer) will do something unexpected unless you have a complete and exact set of instructions.
4. Relate what the students have just seen to how computers function. It is often said that computers are stupid, meaning that they will only do what they are told (programmed) to do. Computers are very good at repeating and exact set of instructions many times and very rapidly, but cannot think in the complex way that a human brain does. The exact set of instructions that computers us is computer code.
5. Help students understand that there are many different languages of computer code, but all have essentially the same building blocks. Similar to how languages that humans use to communicate primarily have the same basic parts (like nouns, verbs, pronouns, etc.), so do different coding languages.
6. Tell students that they will be learning a language called Scratch during this lesson and that they will be using Scratch to program their own computer game.

Computer Basics

1. Assess the students' understanding of the parts of the computer and their function by asking questions and helping to fill in any gaps in knowledge.
2. Make sure students understand the difference between software and data. Software is what tells the computer what to do and how to run. Data is what the user creates via computer applications (a specific type of software).

Code.org

1. Help students get started with Code.org using the type of access you selected for your on-line section. Make sure all students know how to

log in to Code.org, navigate to your section, and get to the lessons in the 20-Hour Accelerated Course that they will be doing for homework.

In-Class Assignment
Assignment 3.1i: Peanut Butter and Jelly Sandwich Instructions

Resources
- Computer Basics http://www.gcflearnfree.org/computerbasics
- Scratch http://scratch.mit.edu
- Code.org http://code.org
- Sorting http://csunplugged.org/sorting-algorithms/

Homework
Assignment 3.2h: Code.org Activities: Event Handler, Move, Turn, and Repeat blocks