Hands on Computer Science Activity 4

Topic: User Interface

Learning Objective: Learn about why products are designed the way they are in order to make the user less frustrated with the focus on computers and mobile devices. Students will learn about human interface design and how good interfaces attract more users to use that design. Students are able to bring that knowledge outside the classroom and be able to observe and wonder the reasoning behind the development of things around them.

Alignment with NGSS Grades 3-5

Performance Expectations and Disciplinary Core Ideas for Engineering Design in Grades 3-5

- 3-5-ETS1-1 Define a simple design problem reflecting an need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the project.

Science and Engineering Practices

Construct Explanations and Design Solutions for Grade 3-5

- Construct an explanation of observed relationships.
- Use evidence to construct or support an explanation or design a solution.

Obtaining, Evaluating, and Communicating Information for Grades 3-5

- Obtain and combine information from other reliable media to explain phenomenon or solutions to a design problem.

Materials:

- Projector/TV (For demonstration purposes)
- Laptop with internet access
- Paper and Pens/Pencils

Detailed Description

- Activity
    - Get settled in the lab, review rules of the classroom and activity for the week.
        - Introduction to good and bad designs
            - Show examples of everyday designs without telling students if they are good or bad, and then review at the end
        - What is a good design?
        - What is a bad design?
        - Why are good designs, good?

- Why are bad designs, bad?
  - Explain how good design in computer science produces better things
    - Mobile app interfaces aspects
    - Operating System interfaces aspects (Microsoft Windows vs Mac OS X)
  - Deciphering a design
    - Affordances of an object -visible features, or appearances, that indicate how the object should be used
    - At the beginning of class, we discussed good and bad designs and possibly figured out that by looking at something, or by using it, we assume we know how to use it
    - Students will each get a piece of paper with a pictures of various door designs and options to open the door, and asked to figure out how to open the door based on the appearance of the door in the image
    - Discuss the results with the rest of class
  - Mini-walk around the building to observe the doors installed
    - Take a look at the affordances of the doors to figure out how they open, and then try to open it
  - Students will explore 2 games (5 minutes each)
    - Mapping of controls - spatial correspondence to everyday objects we are used to
    - Transfer effects - transfer of learning and expectations from previous objects onto new but similar situations
    - Game #1: http://slither.io/
    - Game #2: http://minesweeperonline.com/
  - Analyze the games
    - Which game was easier to understand and why?
    - How do you know how to play the game?
  - Let's make this webpage user friendly!
    - Students are each given a piece of paper with a label and picture of a webpage element. Students are asked to work together to tape the elements on a template webpage posted on the board.
    - Discuss the outcome
      - Is this a user friendly interface for a webpage?
      - Point out details that will work in the favor of the user or not.
  - Review design qualities learned
    - Good design should be simple enough that a person who sees or uses the object for the first time should be able to figure out how to use it after a basic tutorial.

- Natural mapping of attributes lead to immediate understanding.
- Transferring previous learning and expectations of previous objects to new but similar situations lower the learning curve.
- Anything that raises questions or frustration, or requires labels for everything, instructions due to complexity, or many pictures have a design failure, unless intentional.
  - Clean up and review!
    - Are all good designs really that good?
    - Are all bad designs really that bad?
      - Chemists come up with bad solutions but created wonderful products.
    - Push the chairs back to where they belong.

How will you conclude the lesson to enforce the learning objective:
I will review the concepts behind good design and bad design. I will also ask students to think beyond just a good or bad design and understand that maybe a bad design might be a good one or vice versa. Students will be able to leave class wondering how to improve objects or wonder how that object came to be due to a design success or failure.

What science process skills will this lesson exercise?
Communication, observation, prediction, classifying

Safety precautions
None