Classroom Teacher Preparation

Technology 3: Conditionals in Code

Please use the following to prepare for the next SfS lesson.

Description:

This foundational lesson introduces the concept of a conditional statement, relating it initially to students' everyday decision-making processes, and then using a game to allow students to observe the execution of conditional statements, as they would occur within the context of running a computer program.

Lesson Objectives – SWBAT ("Students Will Be Able To…"):

5th-8th

- Understand that all coding languages use common concepts like conditional statements
- Recognize that a conditional statement must be either TRUE or FALSE, and has a well-defined action for both the TRUE case and the FALSE case
- Model receiving input, evaluating conditional statements, and executing an output as a computer would
- Write and use their own conditional statements in a model program

Disciplinary Core Idea (DCI):

PS4 Waves and their Applications in Technologies for Information Transfer – PS4.C Information Technologies

- N/A

Science & Engineering Practice (SEP):

Developing and Using Models

Preparation:

This lesson is introductory and assumes no prior preparation.

Room Set Up for Activities:

Students will work in groups of 3 (small groups are strongly preferred to ensure student engagement). Each group will need a cluster of desks, section of a table, or floor area where they can all reach a deck of cards and a small whiteboard.

Safety:

There are no safety concerns with this lesson.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on Technology. Modules include:

Technology 1: Binary Code – An introduction to the binary number base, which is the system that computers use to communicate information. Students have an opportunity to both encode and decode English alphabetic characters to/from binary code.

Technology 4: Cryptography – A module full of fun activities introducing the basics of encryption, which has evolved into a critical element in modern data storage and Internet transactions.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: http://www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by directing students to an online resource by Code.org, which provides an introduction to block coding and a chance to apply the programming concepts learned in class on an actual computer.

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

WGBH Videos and Activities: The PBS educational site is a great, **free** resource for educators but you must create an account to use the materials. The first time you log in to the PBS Learning Media website you will be asked to create an account and provide an email and password. Once you have logged in, select "keep me logged in" to avoid having to repeat the process.

- Students may be motivated to learn coding if they realize they can make a career out of creating computer games. The institution in this video is not local, but many universities now offer majors in computer science with a focus on game design. (Of course, there are a lot of other career options in the computer field as well!) (2:54): http://mass.pbslearningmedia.org/resource/ate10.sci.engin.systems.gametech/computer-game-and-simulation-technology/

Programming is a great career for women, too:
- http://www.today.com/video/today/53924117

Short introductory videos for younger students, describing computer programming, real-world applications, and computer languages:
- What is Computer Coding? https://www.youtube.com/watch?v=THOEQ5soVpY
- How do Computer Programs Work? https://www.youtube.com/watch?v=Nc31NAujTkA

There are many websites dedicated to educating and encouraging the next generation of coders. Check out those listed on the student Follow-Up activity as well.
- The Code.org website has resources aimed at students, teachers, and parents: https://code.org/
- Codeacademy offers a broad range of free interactive tutorials: https://www.codecademy.com/
- Khan Academy has many computer programming lessons, covering several coding languages: https://www.khanacademy.org/computing/computer-programming