LEARNING MODULES

GK-12 DISSECT at New Mexico State University

Title: Scratch Programming

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Discipline or Area: Programming

Teacher: Tammy Miller-Dwake

School: Arrowhead Park Early College High School

Subject of class: Chemistry

Grade: 9th

COVERAGE OF COMPUTATIONAL TOPICS

Over several weeks we developed programming skills working with Scratch. During this process we naturally incorporated all computational thinking vocabulary. The students were responsible for designing 3 different programs over several weeks.

OBJECTIVES

Students will learn how to program using the scratch language. During this process it will be necessary to develop logical algorithms that address specific tasks.

EQUIPMENT AND MATERIALS

Computers with internet access

BACKGROUND AND REFERENCES

This module was pursued in order to introduce students to simple programming. This was achieved through developing skill using the Scratch platform. Students were required to create three different

programs that addressed specified tasks. Two of these programs modeled or described chemistry principles that were con-currently taught to the 9th grade students. This upcoming semester will reinforce the student's programming acumen through acquired knowledge of Python.

PROCEDURE

Provide detailed instructions on how this module is taught.
The first class was used to introduce Scratch to the students. Students are shown sample presentations and the source code. A sheet with this material is distributed to the students whereupon they must analyze the code. The instructor provides a specific example of each CT term. Upon completion, students are asked to use CT terminology to describe the various sections of the code that created the first example.

Following this session, students are tasked with specific tutorials which can be found at http://learnscratch.org/. Over the following two weeks they will complete Scratch 1 & 2.

For the second class, have the kids actually use Scratch on computers connected to the internet. Have them go to www.scratch.mit.edu. Before this class, set up an account for each class on the Scratch website. This will allow teachers and students to access their Scratch programs from any computer with internet connection. Have the students sign into the Scratch account.

During the class sessions, the students will be using the material learned from the tutorials to create their own programs. The fellow will be present to address any specific questions that arise and to reinforce CT concepts.

The students build upon their acquired knowledge to ultimately create a project that demonstrates a key chemistry concept. After this presentation, students give one another feedback to learn what was successful and what could be improved. These skills are honed and a final program is created that will be incorporated into the Desert Data Jam showing pertinent chemical relationships in the datasets provided.

What were the "learning goals?"

The ultimate goal of this module was to introduce students to basic programming. Additionally, computational thinking vocabulary was reinforced through actual incorporation or utilization of these terms.

How did you introduce CT?
Through actual programming, the students were able to tangibly grasp the meaning of terms previously defined. Furthermore, students began to appreciate the logic inherent in algorithms.

How could you assess the understanding of CT in this module?
We can assess the understanding of CT through the development of actual coding. While programs are being written, we can ask students to describe CT terms through the code that they have written. Furthermore, we can assess their progress in CT skills by witnessing the improvement in their programs.

NOTES AND OBSERVATIONS

What were challenges you encountered in the overall development of the module?
Despite the ease of the program, some students failed to apply themselves to the task. Some of the presentations were repetitive and didn't show much engagement. Also, at times, some difficulties were encountered using the class computers. At times they were slow and wouldn't properly operate.

What was successful?
Scratch is a fun, easy to use program. It is a great introduction to programming as it can boost interest and esteem which opens the opportunity for more advanced programming. By requiring the students to create dynamic presentations incorporating material learned during class, the teacher can form a more thorough understanding of students' mastery of scientific concepts.

How was the students' reception to the content of the module?
The students greatly enjoyed creating simple programs using Scratch. The majority found Scratch an amusing and entertaining platform.
Some presentations were interesting and involved.
http://scratch.mit.edu/projects/37512628/