5.CSY.1 Computing Systems

> *The student will explain how computing systems are used to collect and exchange data. (a) Identify and explain how computing systems store data representations, including images and sound. (b) Describe the role of processing speed and storage capacity when collecting and exchanging data.*

Understanding the Standard

Computing systems are made up of all the hardware and software components that work together to accomplish a task: input, processors, memory (or storage), and output. In fifth grade, students dig deeper into the concept of storage. Computers store data in many formats, including text, images, and sound, by converting the data into a binary representation of the information that can be retrieved later and converted back into the original format. It is good practice to save data in multiple locations to protect against loss. The storage capacity of a computing device varies as does the amount of storage required for the saving of different media (pictures, videos, text documents, etc). Data can be stored locally on a hard drive or on the Internet. The connection should be made that variables in programs are how we store and access data when programming.

Term	Definition
Input	Data that is taken in by a computer for processing
Output	Data that is produced by a computer as a result of a program
Processor	Computing component that performs the manipulation to change input into output
Storage	Computing component that can hold data to be used at a later time

Prerequisite Knowledge

Students should have an understanding of computing systems and their basic components. Students should be familiar with the terms input/output or have prior experience using input/output tables.

Integration Opportunities

Science 5.1b,c Identify how computing systems can be utilized during a scientific experiment to gather data, store it, and display it through data representations.

English 5.C.3a,b Create engaging presentations that include two or more media components. Use a design document to plan how representations will be input, stored, and displayed or shared.

5.MG.2a Have students model measuring and calculating the area of a right triangle as if they were a computer system. Act out different parts: one student "collects" data (measuring the base and height), another "processes" it (calculating the area), and a third "stores and exchanges" the information by writing it down or presenting it to the class.

Physical Education 5.5 Students will explain the nutrition and activity components of energy balance, Demonstrating an understanding of how what we put in our bodies (input) affects our mood, energy, etc (output).

Summary of a Lesson

Review inputs and outputs by having students use a Venn diagram to sort examples of inputs, outputs, and items that can be used as both output and input (ex. touchscreen, flash drive, etc). Discuss what happens to information collected through inputs before being displayed or exported as output: the data is manipulated, or processed, through algorithms stored in the computer. The computer also uses storage to keep some of the information

collected while processing takes place. A great visualization of this process is shown in this video clip from Code.org. Each pair will then be asked to create a flowchart or other visual representation that displays how a computer system works, showing input (including sensors), storage, processing, and output.