Computer Modeling - Introduction to STELLA

Levels V-VI

Grades 9-12

Overview:

Computer models have many applications, and are used by scientists and analysts to predict changes over time. In this lesson, students will be introduced to the STELLA computer modeling program, and will learn to manipulate symbols within a very basic STELLA model of a water cycle using an interactive CD-ROM.

Objectives:

The student will:

- understand how computer models are used to predict what may happen within a system, such as a watershed, over time; and
- use a CD-ROM to become familiar with the symbols used by the STELLA modeling software.

Materials:

- STELLA Introduction Animation CD-ROM

Activity Procedure:

1. Explain to students that scientists often use computers to create models in order to predict changes to a system occurring over time. For example, meteorologists (people who study weather) make weather predictions based on computer models. These models use information like wind currents, humidity, wind speed and temperature to determine what the weather is likely to be in the days and weeks ahead. Some models contain huge amounts of data and require large computers to run, such as models used to determine the movement of stars in the night sky, or to track satellites as they orbit Earth. Ask students if they can name any other examples of computer models (examples may include: models of human population growth, earthquake impacts, and fish run predictions).

2 Explain that STELLA is a computer model that can be run on a desktop computer. It is used to describe and test how a system, such as a watershed, might respond to change. Through careful programming, it will run mathematical formulas and give probable outcomes based on the information that is entered into it.

3. Tell students that the first step in using a computer model is to identify the parts of the system that is to be studied. Ask students if they can define what is meant by a system, and give an example. (A **system** is made up of elements that interact with one another, for example a school system is made up of students and teachers and their interactions.)

4. Explain that the **components** of a system are the parts or elements that make up the system. Students and teachers are the components of a school system. Ask students to identify some of the components within a watershed (examples may include: rainfall, snowfall, evaporation, creek, lake, perimeter size, etc.).

5. The **interaction** of the components within a system, and any interactions between the system and any other systems is what makes the system dynamic, that is, what makes it change over time. The interactions between students and teachers within a school, and the interactions between students and teachers with their community are what makes school a place that changes from day to day and year to year. Ask students to identify the interactions that occur in a watershed (rainfall leads to runoff, sun causes the snow too melt and water to evaporate, and so on).

6. Tell students that transferring this information to a computer system requires the use of **symbols** to signify each of the components within a system. Ask students to watch the STELLA Introduction Animation CD-ROM in order to learn how STELLA uses symbols to represent a simple model of the hydrologic cycle.