

Measuring the Impossible!

Using Intel® Education Lab Camera by Intellisense to Enrich Student Learning

Dr. Dana McCauley, Teaching Principal

Dr. McCauley has been in the education field for 22 years as a teacher, a Coordinator of Staff Development and School Improvement, and currently as a teaching principal. Along with administrative duties, as a teaching principal, Dr. McCauley is responsible for three hours of classroom instruction each day. She has taught at least one content area in each grade level from kindergarten through fifth grade. Advocating for a place-based instructional program, Dr. McCauley has led the staff and community of Crellin Elementary in the development of multiple programs that emphasize using the community as a means for research, projects, and service learning. She has helped integrate technology resources into classrooms to prepare students for 21st century learning. Dr. McCauley has been the recipient of leadership awards for her community outreach and development of educational programs.



Crellin Elementary: Oakland, Maryland

Crellin Elementary is a small Title I school nestled in the mountains of Western Maryland. With 110 students, kindergarten through grade five, Crellin Elementary stands as the hub of the community. In 2004, Crellin Elementary and the community joined forces with local, state, and national agencies to take part in a stream restoration project. The collaboration led to a series of meetings and the "Crellin Corps of Discovery" was created. They successfully garnered support, grant funds and cooperative agreements to restore Snowy Creek from acid mine drainage damage, a result of coal mining in the area. The vision was to maximize opportunities and utilize the stream restoration project as an educational tool for students and the community. The result of this effort is their Environmental Education Laboratory (EEL), which contains an amphitheater, boardwalk, wetlands, vernal pool, bat boxes, and birdhouses all linked by a trail. Additionally, an agricultural program has been developed complete with a barn, sheep, chickens, and vegetable gardens. Through an integrated environmental education and place-based approach, students are gaining experience and knowledge about ecological principles, sustainable living, service learning, and responsible agricultural practices. Crellin Elementary has been the recipient of numerous awards and recognitions for instructional and community programs and academic achievement, including Intel's School of Distinction for Elementary Mathematics in 2011.



Learning Objectives

In this lesson, students will:

- Learn the necessity of calibrating a measurement tool to obtain accurate data.
- Use known measurements to make reasonable estimates of unknown measurements.
- Demonstrate the mathematical ability to convert measurements within a measurement system accurately.
- Analyze data trends and find consistencies and inconsistencies within the data.
- Use critical thinking to make reasonable assumptions.
- Make a visual representation of the data.

Grade Level: 5

Lesson Duration: 45 minutes

Materials and Resources:

- Measuring tape or ruler
- Intel® Education Lab Camera by Intellisense
- JP-IK MG101 A8 – an Intel® classmate PC

Background/Context

This lesson is part of a research unit on tree species. Each year students measure the height of the trees in the schoolyard using traditional tools. Over the last several years the data has been questionable as the trees have grown to heights that make measuring difficult.

Activity

Working in pairs, students will estimate their heights. To check their estimates they will use the Lab Camera microscope program. To accurately check their estimates, the Lab Camera measuring tool will need to be calibrated. They will calibrate the tool following the teacher directions. Once calibrated, they will click on the “distance measurement icon” and click and drag the cross from the top of the student’s head to their feet. The student’s height will appear on the red line. Students will use the knowledge of their personal height to estimate then measure the height of the trees. They will have their photograph taken next to the tree, calibrate the measurement tool using their personal height, and measure the tree height using the same procedure stated above.

The tree height data collected will be added to the previous years’ tree height data. Each student will be assigned specific trees to conduct a trend analysis of height data as well as factual research in order to present findings to peers.

(Calibration directions: Each student will use the built-in camera to take a photograph of his/her partner who will be holding a ruler. Be sure the student and the entire ruler are completely in the photograph, then click the camera icon. They will then use the “size calibration” icon to draw a line the length of the ruler. They will enter the ruler’s total length and correct unit then click the green checkmark, which calibrates the tool.)

Assessments:

Assessment will take place in a variety of ways. Students will demonstrate their ability to convert the tree measurements from centimeters to meters and/or meters to centimeters. They will be asked to reflect on the following questions:

- Are your measurements consistent with the information you discovered in your tree research?
- What are the growth trends of your particular trees?
- What could have caused any inconsistencies from one year to the next?
- Why was calibrating the tool necessary?
- How did estimating the height help prior to measuring with the ruler or the Lab Camera?

Wrap Up and Reflection

Within the Common Core Standards for Mathematical Practice students are expected to attend to precision and use tools appropriately. Teachers need to provide opportunities for students to practice making tool choices, to accurately convert and calculate measurements, and discuss their results in a real world context. Students also need to learn to take information learned in one context and use it to solve problems in a new context. Other units of measure can also be used in this activity and images can be imported into Lab Camera or taken using the built-in computer camera.

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