



Visualization and Communication in a MicroLab Laboratory

A computer is the key element in a MicroLab workstation. User-friendly MicroLab software helps students design experiments, quickly collect high quality data, and then move seamlessly to display and analysis of this data.

Research has shown that the ability to visualize relationships between variables is most effective if less than about one minute elapses between collection of data and viewing the graph.

Design of a MicroLab experiment involves selection and calibration of sensors and easy mouse set-up of data tables and graphic display. Experimental data appears *live* as the experiment runs, in simultaneous digital, data table, and graphic displays. Students can watch the graph appear as the data is collected.

Experiment design and data analysis and evaluation are the most complex components of an experiment. Collection of the data is fast and generally easy. This is why beginning graduate students collect data and their mentors design the experiments, analyze the data, and write the papers.

Because they can collect high quality data fast with MicroLab, there is time during the lab period for students and instructor to work together to design the experiment, to evaluate and analyze the data, and to revise and run the experiment again if necessary.

A MicroLab workstation is designed to support communication:

- Communication of information, fast and with high resolution, from the experiment to the computer screen where students can view it.
- Communication between students and instructor as they discuss the graphs and

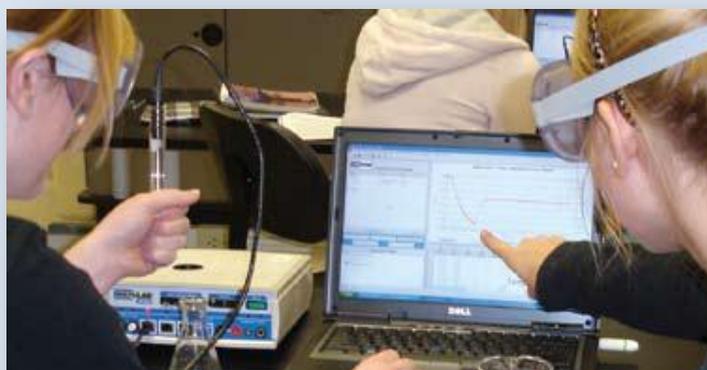


Figure 1: Live, high quality graphs help students visualize relationships between experimental variables. These students are observing the supercooling and freezing of a 1 mL acetic acid sample.



Figure 2: Experiment design, data analysis, and evaluation are the most complex parts of an experiment. With MicroLab, there is time during the lab period for students and instructor to work together on this.

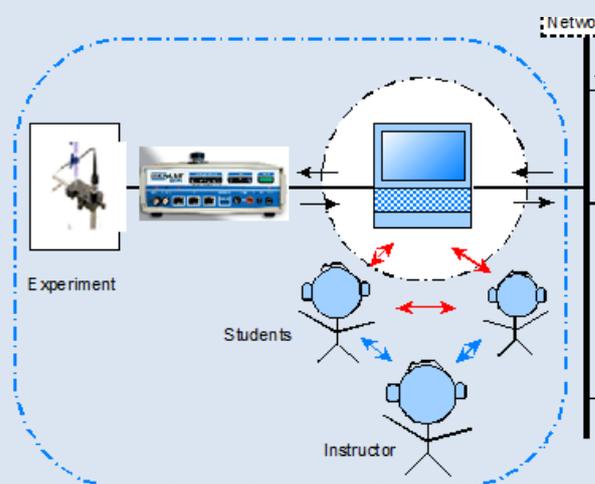
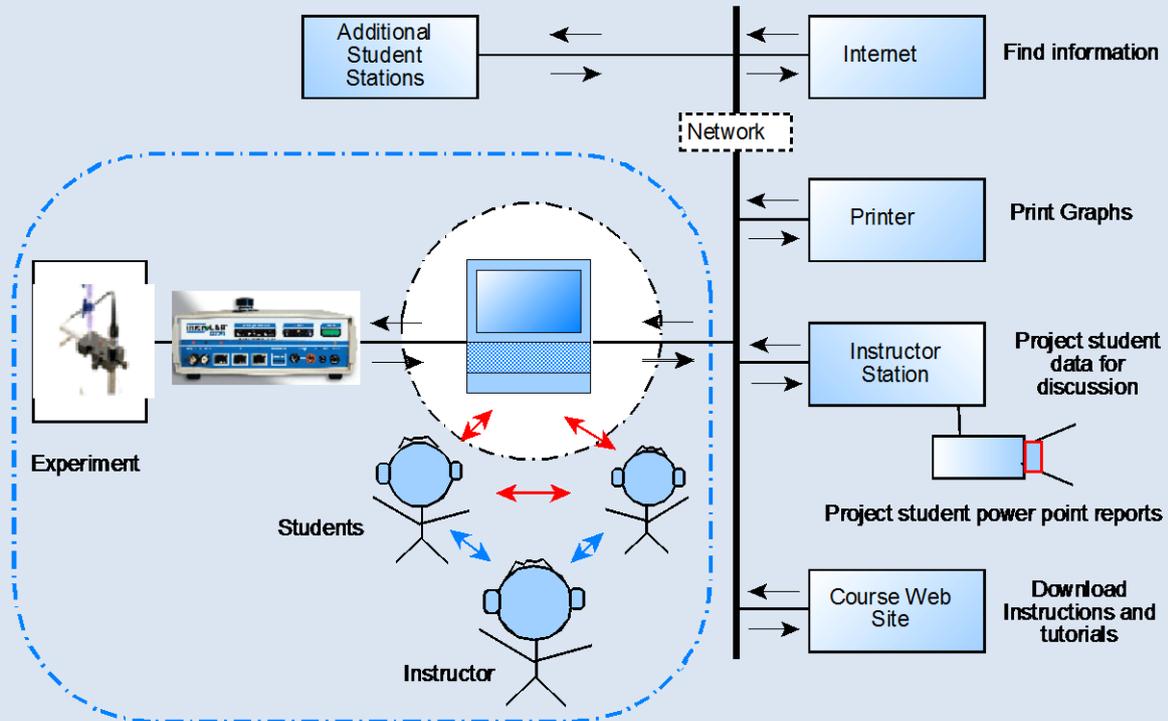


Figure 3: The computer screen is the visualization and communication focal point in a MicroLab experiment.

data presented on a screen large enough for three people to view.

- Communication between the class and the instructor as they view and discuss projected data from several lab groups. A simple laboratory network broadens the discussion from two students and an instructor to all of the students and the instructor.



Inquiry: MicroLab involves students in the process of science.

A MicroLab experiment is a lot more than just collecting data. Students are involved in all aspects of the process of science, from identification of the problem and design of the experiment, to data collection and analysis, to evaluation and concept development.

They have time and software support to do all of this, in the lab, with their instructor participating.

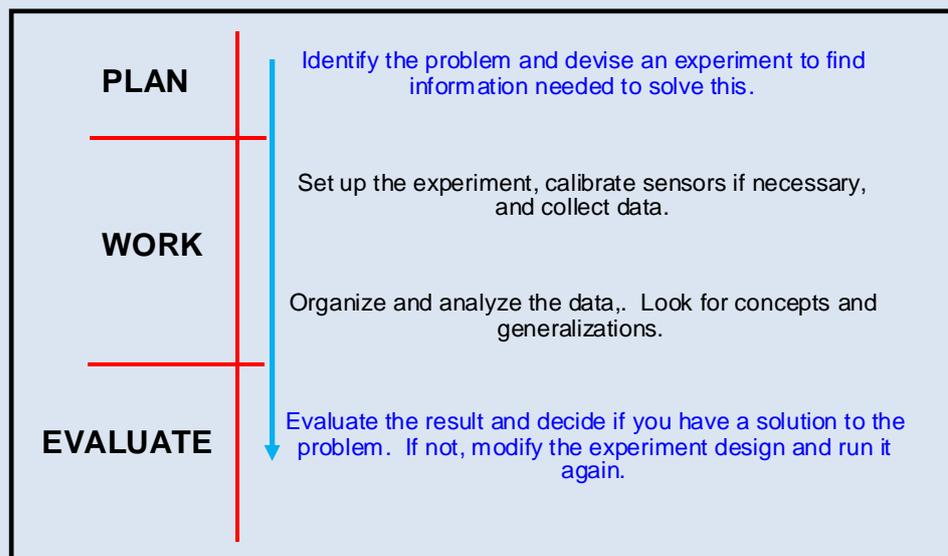


Figure 4: MicroLab provides time, in the lab, for instructors to participate in planning and evaluation of the experiment (blue).