# CLASSROOM MEDIA REVIEWS

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## KITS FOR AT-HOME BIOLOGY

**Introductory Biology.** Version 3, Kit 1108. Developed by eScience Labs, Inc. http://www.esciencelabs.com/. Online content system requirement: Java Version 5 or higher in order to run these programs. E-mail: info@esciencelabs.com.

As an educator, my goal is to make available effective learning experiences to all students. Since I teach some of my classes online, I face the challenge that, unlike students in my traditional laboratory settings, these students are distance learners and must carry out their experiments in their kitchens, their bedrooms, or possibly their living rooms.

It's a challenge to provide online students the same experiments they would find in a traditional face-to-face academic setting. Fortunately, a number of companies have developed prepackaged labs students can perform at home. This review looks at some of the biology kits available from EScience Labs, Inc., a Colorado-based company that also provides kits for a variety of grade levels and subject levels such as physics, biology, environmental science, anatomy and physiology.

I tried out an eScience custom kit that was developed for an introductory biology course and found it to be a good supplement for an online non-majors course. The lab manual included 15 academically sound and thought-provoking experiments on topics such as: the scientific method, writing lab reports, introduction to the microscope, diffusion, osmosis, respiration, photosynthesis, enzyme activity, cell structure and function, cell division, Mendelian and population genetics, taxonomy, and ecology. I was free to choose either to have students carry out all experiments in the package or to custom fit according to my needs and style.

Each kit that students purchase includes access to online content which is designed to supplement the hands-on experiments, provide pre-lab exercises, and reinforce important concepts to support the activities. Registered users also have access to a monitored blog where they can compare results, pool data, and communicate with other students–I like that this encourages collaboration among students who might not otherwise interact.

One concern I have with students performing experiments at home is safety. To ensure proper handling of chemicals supplied in their kits, eScience has reduced the use of such chemicals and–if used at all–the volumes are very low. Since some of the experiments involve chemicals, eScience provides online video demonstrations to help convey precautionary steps for safe handling. I appreciate that eScience is available for students via e-mail and telephone in case they have safety questions or need other support while they carry out their experiments.

One interesting experiment covers the concept of osmosis. In this kit, students examine the effect of solute concentration on osmosis. All materials such as plastic rulers, plastic graduated cylinders, pipets, dialysis tubing, beakers (250 ml), sucrose solution, beads, etc., are provided in the kit. Students measure and create their own working concentration of sucrose (i.e., 3%, 15%, and 30% solutions) by following the directions. They pour their solutions in dialysis bags and tie different color beads as markers at the end of the dialysis tubes. The filled dialysis bags are placed in beakers for an hour and the contents of each bag are measured by the provided graduated cylinders. The volume is read and recorded in a data table and the students are able to determine whether water is taken in or out of each bag. The exercise is followed by a series of questions to help students understand the concept of hypotonic, hypertonic, and isotonic solutions. To further explore the concept of tonicity, students may carry out an extension exercise with potato strips and a 20% NaCl solution to understand how the presence of a cell wall in plants affects their response to a hypertonic solution.

Another lab from the eScience kit uses yeast cells, sucrose, Equal, and Splenda to determine the rate of anaerobic respiration in the presence of different carbohydrates. The students learn to construct their own respirometers by filling a small tube with water and inverting it within a large tube. Students later follow directions to set up the various strengths of carbohydrate solutions in a test tube rack. At the end of an hour's time, they measure the air space in the internal tube and record it in a table. Instructors can have their students follow up this experiment with an extended laboratory exercise where soybeans are used to evaluate the production of carbon dioxide between germinated and non-germinated beans. All materials and chemicals needed for these wet experiments are provided in the kits.

Given the clear directions, thorough lab contents, and online support, I think the eScience kits are among the best and most economical hand-held science kits available on the market. If you want your students to experience science on their own, improve their abilities as independent learners, or just reach students at a distance, the kits are worth a look.•

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