Using Reusable Learning Objects and Animations to Make Learning Easier for both Traditional and On-Line Students

Presented by:
Gary E. Kaiser
Professor of Microbiology
Biology Department, D-203F
The Community College of Baltimore County, Catonsville Campus
Baltimore, MD 21228
Phone: (443) 840-4289
Web Site: The Grapes of Staph at http://student.ccbcmd.edu/~gkaiser/goshp.html

Background
A learning object is an educational resource, typically digital and web-based, that can be used and re-used to support learning. A learning object is a small, self-contained, re-usable unit of learning as opposed to the more traditional hour-long lecture or textbook chapter, and can range in size from a single animation, illustration, or chart to an entire course.

When a learning object that includes learning assignments, lesson plans, or other instructions for use, it referred to as an enhanced learning object. These can be used as activity-sized or lesson-sized learning experiences.

When constructing learning objects, keep in mind that they should usually be:

- **Activity-sized** - Large enough to be used as an activity within a lesson or module, content time typically ranging from 2 minutes to 15 minutes.
- **Self-contained** - The learning object can be taken independently.
- **Accessible** - Easy to locate and use.
- **Durable** - Retain utility over a long period of time.
- **Reusable** - Can be used to create other learning activities within a given content area or other content areas (reusable learning objects).
- **Can be aggregated** - Learning objects can be grouped into larger collections, including traditional course structures.

In constructing each of my learning objects I've tried to include:

- A list of **learning objectives** for that object telling the learner what they should be able to accomplish after completing that learning object and on what they will be tested;
- **Illustrations, photographs, and/or animations** to help the visual learner; and
- A **self-assessment component**.

While learning objects are not entire courses, they can be nested together to create courses. I have converted my microbiology course into a series of nesting learning objects. Many of these learning objects are reusable and are found repeated a number of times throughout the course for the purpose of reviewing, previewing, or reinforcing relative information.

I've also created a number of on-line Biology Tutorials for use in our general Biology course and other Biology courses. These are also presented as learning objects and can be found at http://student.ccbcmd.edu/~gkaiser/ biotutorials/index.html.

A list of and link to all of my on-line animations can be found at http://student.ccbcmd.edu/~gkaiser/Start.html.
Using the Internet to Support Microbiology Lectures and Labs

Providing Students with the Information
I use my website to present course content to both my web students and my traditional students. My lectures are presented in a smart classroom and I use the Internet much in the manner of a Power Point presentation. Students are required to have a hard copy my on-line Lecture Guide and my on-line Lab Manual.

Students are able to:
1. Purchase a hard copy printed by our college press from the college bookstore.
2. Print a PDF copy from my website. This is especially useful if students have a color printer.

Supporting Lecture and Lab with Visuals
All totaled, my web site contains approximately 1000 pages of text, 1000 illustrations (computer generated graphics, photographs, photomicrographs, electron micrographs, etc.), 250 animations, numerous crossword puzzles, and many links to other relevant web sites. Visual aids are a key component of my Learning Objects.

1. Computer generated graphics
I used Adobe Illustrator 10.0.3 to draw all of my illustrations. These programs can be picked up pretty quickly and I find making the illustrations fun.

2. Animations
The vast majority of animations are Flash animations done using Macromedia Flash Professional 8. I used Adobe Illustrator 10.0.3 to draw the individual cells and import them into Macromedia Flash Professional 8 for animation. While Macromedia Flash Professional 8 has its own drawing program, I find Adobe Illustrator to be more useful and sophisticated. A few animations are GIF animations done with CoffeeCup GIF animation 2.0. The animations were initially time consuming but a lot of fun to make. With experience, they can be produced fairly quickly and students really seem to appreciate them.

3. Photomicrographs
Most of these have been taken using either an Olympus BH-2 microscope with a Nikon DS-L1 digital camera control unit and a DS-5M camera head, or using an Olympus CX41 microscope and an Olympus DP20 digital camera unit.

4. Electron Micrographs
Some of these are flat bed scans of electron micrographs colleagues have let me use. Others have been captured and used with permission from other web sites such as MicrobeLibrary and The Centers for Disease Control and Prevention. A special thanks goes out to Dennis Kunkel of Dennis Kunkel Microscopy, Inc. at http://www.DennisKunkel.com/ for permitting me to use a good number of his excellent electron micrographs.

5. Crossword Puzzles
The crossword puzzles are intended as a study aid to help students learn vocabulary. I have a puzzle for each lecture exam and each lab quiz. Students turning in their completed puzzle with their exam or quiz get one point extra credit. Puzzles were constructed using a free, downloadable program called Eclipse Crossword.

Selected Sources for On-line Learning Objects
