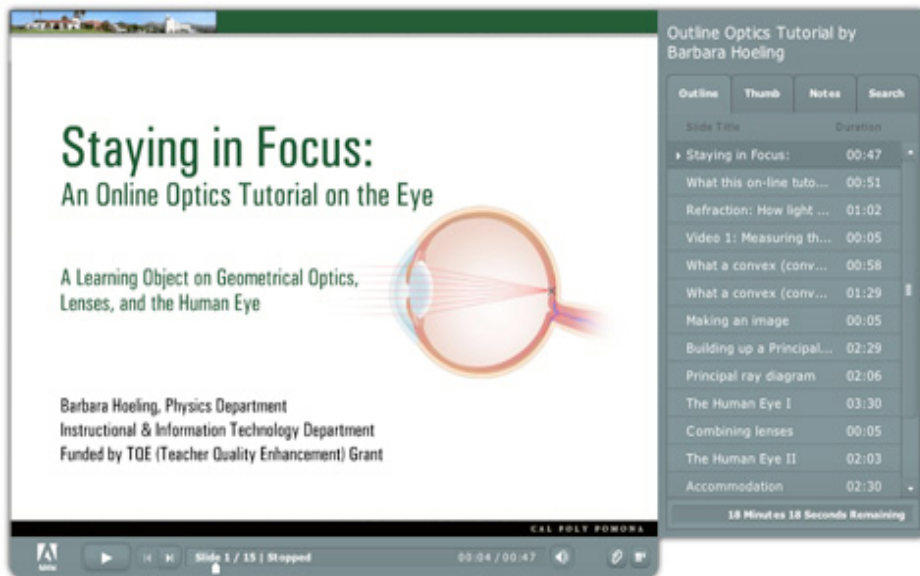


Case Study **Staying in Focus**



SCI 210 is an introduction to physics concepts and activities covering mechanics, heat, sound, light, electricity, magnetism, properties of matter, and modern physics which prepares students to teach science. This course is developed to use inquiry-based laboratory work and student-led activities.

Dr. Barbara Hoeling first approached I&T Learning through the TQE program, where instructional designer Karen Brzoska lead her in the right footsteps. Dr. Hoeling had been

inspired by an earlier I&T Learning project created for Dr. Laurie Starkey, Chemistry Dept., on a pre-lab tutorial for [distillation procedures](#).

You can view a case study video of the "Staying in Focus" online tutorial by clicking the following link:

[Click here to view case study video](#)

[Click here to view Optics Tutorial](#)

The Challenge

To develop a solution that would increase Dr. Barbara's students' understanding of optics concepts and to provide them with preparatory opportunities before performing the actual in-lab experiments.

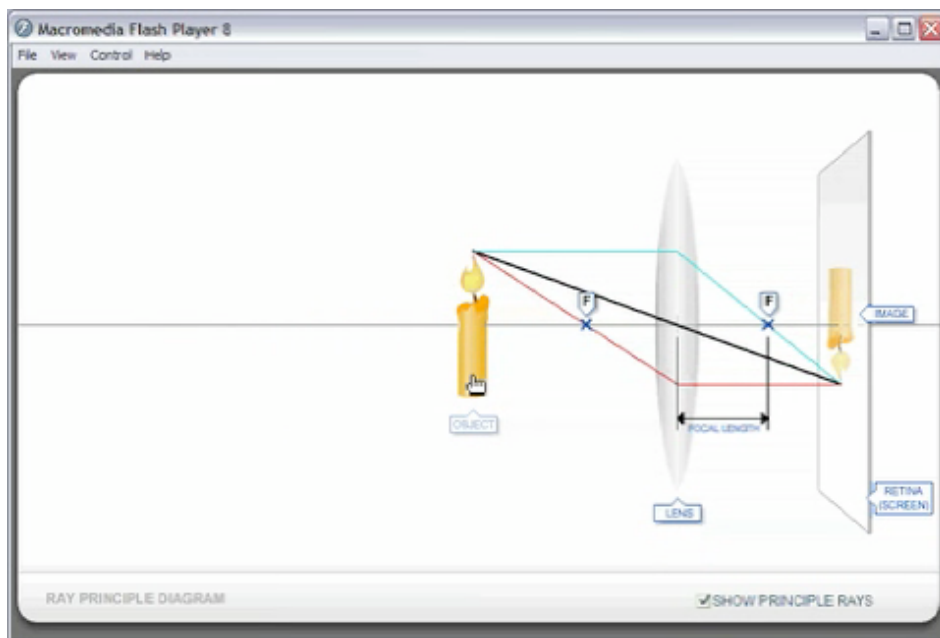
"Usually when we start the optics experiment in the lab that comes with these lectures, a lot of times the students are confused, they don't know how to set up the experiment."

Some of the challenges included simulating the principle ray diagram, accommodation of the eye when objects move from far to a closer distance, demonstrating the lab setup for the experiment, and the reaction of light shining through a squeezable lens.

"This is not something you can do [through] experiment[ing] very easily because you... typically don't have lenses that you can squeeze and change the focal length of."

As part of the challenge Dr. Hoeling needed a way to deliver this information to her students.

The Solution



The I&T Learning team used a combination of video, Adobe Flash, and Adobe Presenter (Connect) to provide a number of demonstrations, interactive simulations, and assessments that were accessible through the Internet.

Within the video segment, Dr. Hoeling was able to demonstrate the set-up of the experiment.

“They know the equations but that does not necessarily tell them how to set up the experiment... So this tutorial should have different elements. One of them is video where I simply demonstrate how to set-up the experiment.”

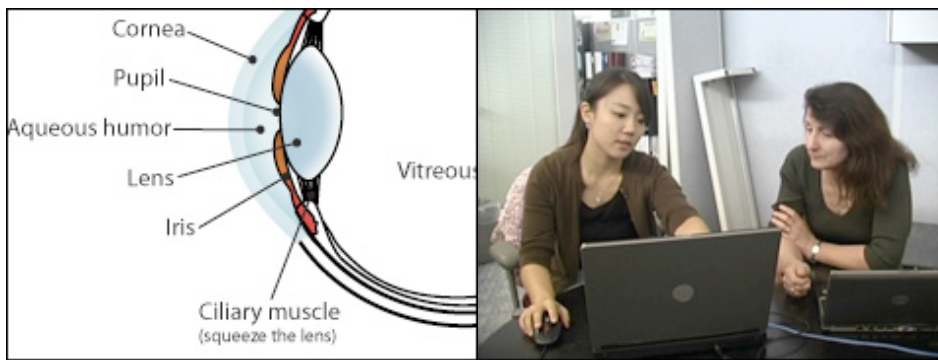
There were a total of three videos that demonstrated three separate elements of the experiment. These included measuring the focal length of a convex lens, how a convex lens forms an image, what happens when a convex and concave lens are combined and put next to each other.

The interactive simulations helped demonstrate some of the more complex concepts that were difficult to demonstrate in a lab environment or through colorful textbooks and images. One of the simulations included changing the distance of an object to demonstrate the reaction of the focal length and principle rays in relation to a convex lens. Other simulations included the ability to squeeze a lens to display the bending of light rays passing through it; and an exploration of how to correct the vision problems of near sightedness and far sightedness through the use of convex and concave lenses.

“So I think the animation will actually give the students more information than they could be getting from an experiment.”

Finally all the elements were stitched together using Adobe Presenter and delivered online through Adobe Connect so they could be viewed with Adobe’s Flash player. Students were required to take a pre test before engaging in the tutorial and then were reassessed upon its completion. By comparing the results from these two tests Dr. Hoeling was able to see a significant improvement in her students’ learning and a better understanding of the optics experiment.

Behind the Scenes



The project was developed through a ten-week period where I&IT Learning's development and instructional design team combined its efforts to deliver from concept to completion. The process involved preliminary meetings with I&IT Learning's instructional designer, Karen Brzoska, to help in creating a direction for the project, including storyboarding video, and later helping maintain an effectiveness in the pedagogy of the project.

The video shoots involved I&IT Learning's MediaVision team members Terry Hogan, Rick Cass, and student assistant Richard Garippo for the actual production of the video. The filming involved in-studio and off-site video shoots in order to capture the essence of the subject matter that Dr. Hoeling wanted to deliver. For example, at one point the sun was used as the light source to bend light through a lens focusing it enough to light a cardboard on fire.

For the interactive simulations, Dr. Hoeling worked with multimedia developer Erick Zelaya and later instructional designer Jason Beers, to produce interactive simulations using Adobe Flash technology. Various interactive simulations were accomplished that may not have been feasible to reproduce in a physical space. The process involved a detailed understanding of the subject matter and required a good number of rough sketches interpreting the concepts in a visual manner. Plenty of math and programming was used to reproduce these concepts in a visual, interactive form that would give the students a qualitative interpretation through interactivity.

Meanwhile, I&IT Learning's instructional designer and Connect coordinator Bo Soh worked with Dr. Hoeling to stitch together the actual tutorial that would house all the different pieces. It was decided that Adobe Presenter would be the best solution for this final delivery. Regular meetings were held to create and implement content that included text, graphics, and sound that would later become the housing element for the video and interactive simulations as well. The final deliverable was a streaming multimedia tutorial that was accessible by the students 24-7 from any computer with an Internet connection and the Flash player client.

You can view a video with more behind the scenes production, testimonials, and outcomes at <http://video.csupomona.edu/bmhoeling/casestudy-245.aspx>.

The People Involved

Subject Matter Expert: Dr. Barbra Hoeling

Instructional Design: Karen Brzoska

Audio/Video Production: Terrence Hogan, Rick Cass, Richard Garippo, Cynthia Martinez

Video Transcript: Peter Siegel, Kristoffer Mendoza, Christine Tsuie

Photography: Maria Salazar

Flash Multimedia Development: Erick Zelaya, Jason Beers

Multimedia and Adobe Connect Production: Bo Y. Soh

Video Case Study: Karen Brzoska, Jenna Kinsey