Integrating writing into the optics curriculum

Grover A. Swartzlander, Jr.
Optical Sciences Center, University of Arizona, 1630 E. University Blvd., Tucson, AZ 85719
telephone: (520) 626-3723; fax: (520) 621-3389; e-mail: grovers@optics.arizona.edu

Maliaca Oxnam
Science and Engineering Library, University of Arizona, Tucson, AZ 85719
e-mail: oxnamm@u.library.arizona.edu

Lisa Lebduska
College Writing, Wheaton College, Norton, MA 02766
e-mail: llebdusk@wheatoncollege.edu

Abstract: In response to a need for interactive learning, we designed a physical optics course that incorporates writing-to-learn principles and allows students to meld in-class theory with real-world practice. Students "published" their papers on the open-access web. This exercise necessitated that students understand principles sufficiently to simplify complex topics for a broad general audience.

©2003 Optical Society of America
OCIS codes: (000.2060) Education; (000.5360) Physics literature and publications

Summary

Advanced courses in physical optics require problem-solving skills that may include calculus, complex numbers, trigonometry, algebra, and graphical representations. Abstract concepts are described -- sometimes to explain commonly experienced phenomena. Rather than supplementing empirical knowledge, students often supplant it with an analytical version of nature. In large part this abandonment can be attributed to the lack of qualitative information covered in these courses. Academic institutions expect the syllabus to be densely packed with technical topics, leaving little class time for integrating analytical and qualitative knowledge. Many believe students would be better prepared to master their discipline if they had experience assimilating both types of information [1,2].

Given limitations of the syllabus and the schedule, a natural solution is to find sufficiently interesting projects for the students to explore qualitative aspects on their own. We have found that this goal can be achieved while also satisfying other missing elements [3] such as writing, information and technical literacy, communication, and teamwork. A solution is to assign a writing project that describes to an educated audience either a physical phenomenon or to report on the life and science of a noteworthy scientist or engineer [4]. The students not only use the World Wide Web for researching their topic, thus gaining an exposure to information literacy, but they also publish their report as a web page, thus providing a very real and wide audience [5]. This latter requirement gives the students a greater stake and sense of ownership in the project. Teamwork skills are honed as well, owing to the students’ limited technical knowledge of searching and writing for the web.

References