Do-It-Yourself Multimedia Teaching and Training Tools For the Laboratory and Classroom

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Teaching and training users how to operate laboratory equipment is a time-intensive practice. Many new users are students, who generally have high turnover rates; after they complete a class project or degree program, they leave the facility. In addition, users often divide their time among a variety of techniques and equipment. With episodic usage, researchers tend to forget details of instrument operation, and retraining is required. Academic core facilities must balance their productivity against the time it takes to train and retrain an ever-changing parade of users. Site-specific multimedia teaching and training resources, such as films, CDs, videos, or DVDs, if easily available in the lab, would enable users to refresh themselves on equipment operation.

Videos, CDs, and websites that highlight the use and theory of operation of equipment, already exist [e.g., 1-4]. Although these resources provide general information, they are not applicable to training users in site-specific operation procedures and in maintenance guidelines for a given instrument in **your** laboratory. Popular software such as PowerPoint® is useful for creating slide shows that include instructional video clips, but its inability to edit video clips and modify soundtracks limits its overall utility in this regard.

In the past, producing training videos or equivalent teaching aides about equipment operation required expensive resources: camera, crew, editing equipment, and the like. Recent advances in consumer digital image electronics have powered development of inexpensive cameras and software for dealing with video images. There are now several low cost, easy to use programs for digitizing and editing video images, inserting them into a sequence along with title boards and still images, then exporting this edited session to a CD, DVD, or VCR. Simple video editing now comes bundled as part of the newer operating systems: Windows Movie Maker® for Wintel machines, and iMovie® for the Mac. These allow you to import videoclips or still images and store them to the right of the viewer [Figure 1]. Each clip can then be edited for content and dragged to its proper position in the video timeline below. New titles and various effects can be inserted for effective transition between segments. Once assembled into a final training program, the session can be output in DVD, VCR, CD, or web-compatible format. DVD or VCR yields the best image quality; the others suffer various degrees of degradation.

The SDSU EM Facility is already using video editing software to create training CDs for in-house equipment. The CDs enable users to see and hear the equipment as the step-by-step operation protocol is demonstrated and explained. The Facility provides these CDs to new users to introduce them to each instrument's operation. After studying the CDs, new users are tested for their understanding of the instrument and its operation and then are required to demonstrate the operation of the instrument. Using these CDs cuts training time in half, and maintains a uniform presentation so that all users operate under the same guidelines. The CDs are inexpensive to duplicate, and, given the ubiquity of CD drives in computers, are readily viewable

at diverse locations at the researcher's convenience. Users who need a refresher session need only review the CD. (We will shift to DVDs when more computers are routinely configured with DVD drives).

In closing, these easy to use editors make it possible to create inexpensive, site-specific training tools, as well as class-specific teaching aids for the classroom.

[1] EM-Specimen Preparation I & II (1991), Leica Instruments AG, videotape
[2] The Principles and Practice of X-ray Microanalysis (1997) Oxford Instruments plc, CD
[3] http://microscopy.fsu.edu/optics/webresources/index.html with virtual light and electron microscopes
[4] The Microscopy Society of America maintains a listing of resources for teaching microscopy at http://www.msa.microscopy.com/ProjectMicro/PMHomePage.html

Fig. 1. Desktop view of iMovie® image editing mode