Production of Interactive Digital Video for Biology Education
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Introduction: The goal of the bioMovies project was to develop short digital video clips, longer narrative videos, and interactive QuickTime movies that elucidate basic laboratory procedures and selected topics of animal form, function, and natural history. These visuals were originally planned for use in large, introductory biology courses at the college level to teach laboratory techniques and basic concepts of biology to beginning students or for upper level courses in Developmental Anatomy, Animal Diversity, and Ecology. However, with appropriate input from instructors, the visuals can be used successfully in primary and secondary education and across a broad range of University curricula. All visuals can be played from a CD or hard drive on a classroom computer. Since the user interface is a web browser, these materials may also be placed on course websites and have successfully used in distance education courses. We are in the process of uploading these visual “learning objects” to the North Carolina Learning Object Repository for use by educators throughout the state.

Short Video Clips
Animals were videographed under compound and stereo microscopes or in natural habitats ranging from local (Southeastern USA) to worldwide. A variety of animals were used, including both common and exotic species.

Methods: The principal investigators used digital cameras and camcorders to capture high quality stills and videos of microscopic organisms, embryos, animals in their natural habitats, and laboratory procedures. Both invertebrate and vertebrate animals are featured. Natural habitats range from local to worldwide including Antarctica, India, China, Madagascar, Australia, the Caribbean, and the Galapagos Islands. One of the principal investigators (Dr. Harold Heatwole) travels broadly and visits a variety of remote areas, allowing unusual scenes to be filmed. Audio, animation, and interactive features are integrated with some of the video clips, using appropriate software (Final Cut Pro, VR Vox, and LiveStage). The final products are currently in QuickTime movie format. Processing of the images and videos into interactive movies is performed by the principal investigators and their graduate students. We solicit the participation of undergraduates in the College of Agriculture and Life Sciences who receive academic credit for their work. This approach is cost-effective and uses the creativity and skills of our best students. It provides a student viewpoint on educational value that influences the design of interactive features and the user interface. We solicit feedback from educators to help refine current offerings and to determine the need for future products. Free downloads and a feedback form may be obtained from the bioMovies website.

Longer, Narrative Videos
Long videos (5-8 minutes) were designed to provide in-depth coverage of interesting or unusual animals in their natural habitat or to serve as instructional videos for common laboratory procedures. All of these videos feature narrative audio and may utilize captions, split screen technique or interspersed still images with labels, as appropriate.

Interactive QuickTime Movies
Selected video clips and still images were used to create QuickTime movies. Interactive features were added, including chapters, pop-up labels, descriptive text, moving arrows, explanatory diagrams and links to other movies, still images, or outside web sites.

Summary: The objective of this project was to develop digital videos and interactive movies to enhance student appreciation of animal biology and environmental issues and to facilitate learning in the areas of animal diversity, vertebrate anatomy, embryology and laboratory techniques. After capturing appropriate video clips, we utilized QuickTime movies technology to add audio and interactive features such as moving arrows, pop-up labels, text tracks, 3D rotation, and “hotspots”. The resulting interactive movies may be played from a CD, transferred to the instructor’s computer for use during class or placed on course web sites for student use outside the classroom. Undergraduates at NC State have participated in the creation of the interactive movies, providing a student viewpoint on their educational value. Feedback from student and instructor users has indicated good potential as a learning tool. We plan to make all resources available through the North Carolina Learning Object Repository at http://www.nclor.its.state.nc.us/.

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