Digital Textbooks for Mobile Devices

Phase I: Developing mobile device-ready content for Marine Megafauna (BIO 127)

A Proposal to the Duke Center for Instructional Technology JumpStart Program

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Summary

Phase I: Developing mobile device-ready content for Marine Megafauna (BIO 127)

A Risso’s dolphin surfaces in the waters of Onslow Bay, NC

The Marine Megafauna (BIO 127) course seeks to engage students broadly in marine science and conservation, through inspirational examples that focus on whales, penguins, sea turtles and other large charismatic megafauna. The course relies heavily on multimedia including professional quality photos of these animals and their habitat, video of animals, and animation to visually present facts about their behavior, anatomy, and ecology. We propose to begin developing a novel ‘digital textbook’ for the Marine Megafauna course that would integrate our use of photo, video and audio teaching tools and serve it to students in a digital form optimized for mobile devices, and in particular the Apple iPad. Eventually, this ‘textbook’ will take the form of an integrative native mobile device application that would integrate inspirational e-book type content (including great photos and illustrations), local and online video examples, scholarly research articles as well as some interactive simulations/ animations of animal behavior. For phase I of this project, we seek funding for a student assistant during the summer and fall of 2010 to start transitioning static content into mobile device ready materials and to develop a digital binder of course readings deployed via bibliographic software packages (e.g. papers). We seek funds to support the purchase of software for content creation, to enroll in the iPhone/iPad software development program and to purchase licenses for bibliographic software Papers as required. Finally, we seek funding to purchase 3 Apple iPads as development platforms for this project.
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**Budget**

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Background

Marine Megafauna (BIO 127)

ENGAGING STUDENTS IN MARINE SCIENCE AND CONSERVATION

A leopard seal consumes an icefish in the Errera Channel, Western Antarctic Peninsula

At present, faculty and research scientists from the Duke Marine Laboratory teach an engagement course on main campus in Durham that focuses on marine megafauna. This course covers the ecology, systematics, behavior and conservation of large marine animals including giant squid, bony fishes, sharks, sea turtles, seabirds, and marine mammals. It introduces students to the relations between ocean dynamics and large marine animals, and provides students insights in the the roles that marine megafauna species play in ocean ecosystems.

Charismatic Nature of Marine Megafauna

Whales, dolphins, sea turtles and other large marine species are incredibly charismatic. These compelling species act as natural hooks to gain the interest and maintain the attention of students, helping them learn and retain key concepts about marine ecology, conservation and ocean dynamics. Our Marine Megafauna class provides an engaging introduction to marine ecology. Through this course, we can identify students within interests and aptitude in marine sciences and subsequently recruit these students to study their topics of interest in greater detail at the marine lab.
Photos, Video and Audio

Marine Megafauna (BIO 127)

EXISTING ASSETS CAN AUGMENT LECTURE MATERIALS

Compelling digital media

The charismatic nature of marine megafauna can be best utilized for educational purposes through the use of digital media - in particular high quality photography, video clips, audio recordings and interactive illustrations diagrams or charts. In the case of marine megafauna, our research group (and our networks of colleagues) have extensive archives of photos, audio and video that can be (and currently are to some extent) used to help teach the marine megafauna class. These digital media archives cover the vast majority of species addressed in the course, and can be used legally without copyright infringements.

Bridge lecture topics and course readings with compelling media

The current set of lectures for Marine Megafauna do make use of some compelling media, but the use of video, audio and interactive diagrams has not been fully exploited. Some lectures contain short videos or links to online video resources, and there are only 3 or 4 that make use of the extensive audio resources we have access to. Furthermore, the majority of these rich media examples lack ‘bridging materials’ that connect the media resource with lecture and course readings in direct ways. These bridging materials include, but are not limited to, illustrations, charts and interactive diagrams that help connect the lecture theory with observed behaviors or results.
Digital Media to Mobile Devices

Marine Megafauna (BIO 127)

NOVEL APPROACHES TO DELIVERING COURSE CONTENT

Black-footed albatross soars over the lagoon at Midway Atoll

Readying new content for delivery to mobile devices

University students increasingly interact with information through mobile electronic devices such as laptops, smartphones and tablet computers. To take advantage of this, we propose to redevelop course materials for Marine Megafauna in a way that exploits rich media and mobile devices to increase their use by students. In particular, tablet devices such as the Apple iPad hold great promise as mobile devices for education. They are light, easy to use and relatively inexpensive, and can display a wide range of information - from traditional powerpoint “slides” to high-definition video and interactive diagrams. They can also be used to interact with other class participants in real-time and to tap external sources of information at any time, providing significant opportunities for just-in-time learning. These devices also provide opportunities for students to learn about digital applications that may be useful for academic careers such as bibliographic management software.
Towards a digital textbook for Marine Megafauna

Ideally, a digital ‘textbook’ for Marine Megafauna would be in the form of an integrative mobile device application that would integrate inspirational e-book type content (including great photos and illustrations), local and online video examples, scholarly research articles as well as some interactive simulations/animations of animal behavior. As the fields of marine science and conservation are continually evolving, having a flexible digital system of delivery provides for seamless updates to course content.

At present the Marine Megafauna course lacks a structured approach to integrating new and compelling media, and also lacks sufficient bridging materials to link these new media examples with existing course lectures and readings. As phase one of developing a digital textbook for Marine Megafauna, we seek funding to hire a student illustrator to develop detailed body-plan diagrams for the major marine megafauna taxa and and create other static bridging materials as required. We also seek funding for a student assistant during the fall of 2010 to start transitioning static content into mobile device ready materials for the course that can be delivered to students through the web when the course is next taught in Spring 2011, including the development of a digital binder of course readings deployed via the most commonly used bibliographic software packages (Endnote, Papers and other online programs). We seek funds to support the purchase of software for content creation (Adobe Creative Suite 4 Design Premium), to enroll in the iPhone/iPad software development program and to purchase licenses for bibliographic software (Papers - see http://mekentosj.com/papers/) as required. Finally, we seek funding to purchase 2 Apple iPads as development platforms for this project. These devices will be used to test how course materials are developed for mobile applications and assessed for their utility in classroom settings. The detailed budget for phase one of this project is provided below.

Assessing the impact of content enhancement

As part of the ongoing project, we will assess how our efforts effect the learning experience of students in Marine Megafauna and attempt to determine if this approach is successful in recruiting more student to the Duke Marine Lab. In Phase I, we will generate new content for the class, and use this content in teaching materials during the next period that Marine Megafauna is taught - Spring 2011. As part of this rollout, students will be asked to undertake a brief survey that gauges their interest in marine science and conservation and they will also be asked to
provide their views on the use of mobile devices and the photos, animations, videos, and interactive diagrams in the course. A second survey of this type will be undertaken at the end of the course, to see if students’ viewpoints have changed. As well, we will examine the trajectories of students post-Marine Megafauna in an attempt to see how many students are recruited to study at the lab, in comparison to previous years.

Examples of ‘bridging’ materials for Marine Megafauna (BIO 127)

A variety of bridging materials can be developed for Marine Megafauna, and these materials will likely be useful for other courses. For example, the movements of animals fitted with telemetry devices can be animated to provide students with perspective on how animal movements relate to ocean features. This includes broad-scale examples, such as the movements of foraging seabirds across ocean basins, or fine scale perspectives on the underwater movements and behavior of humpback whales conducting bubble-net feeding (see images below). Other animations could focus on comparisons of locomotor style of marine animals (e.g. contrasting fish swimming with whales, or comparing swimming between phocid and otarid pinnipeds). Other possibilities include the development of interactive population models for students to explore demographic changes in populations under various scenarios of exploitation or stress or interactive models of changes in sea level or sea ice cover and the potential effects on marine megafauna.

Frame-grabs of animated visualization of individual humpback whale variations in feeding behaviors created in the software package Trackplot. Ribbons indicate whale orientation and travel, yellow areas indicate off-axis rolls, and red triangles are fluke strokes.
The underwater paths of two humpback whales in relation to surface vessels as visualized in 3 dimensions with GeoZui 4D software.

Phases II and III

Phases II and III will build on the above proposed work to fully convert online course materials into a native iPad/iPhone application and test how students use mobile devices in the Marine Megafauna classroom. Phase two will likely focus on developing the native mobile device application, based on a core framework for applications that can then be re-used where desired to deliver materials for other courses taught at the Duke Marine Lab, (e.g. Marine Mammals, Marine Conservation Biology and others). This may involve the use of emerging commercial development packages designed specifically for these types of applications (e.g. Inkling - see http://www.inkling.com). Phase three will focus on deploying iPads in the Marine Megafauna classroom as tools for students to read, study, interact with and annotate course content.
## Budget

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**Software and Development**

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**Grand Total**

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