

Floral and Faunal Identification Made Easy: a Novel Approach to an Old Problem

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Background: Rationale for Overall Project

As humans impact this planet more and more, the need for effective conservation education has increased substantially. Training students in conservation biology requires a hands-on, in the field approach in which students develop projects that are applicable to specific conservation problems. Many of these projects require the ability to quickly identify local flora and fauna (e.g., trees, frogs, flowers). Unfortunately, considerable training is often required before students' identification skills can be considered reliable and time to conduct proper training often reduces time available for actual completion of the project. For most floral and faunal groups, field guides are the traditional way to identify various species. Unfortunately, for many groups, the numbers of species in field guides can be overwhelming. Additionally, dichotomous keys, the traditional method utilized for identifying species of animals and plants, usually require knowledge of characters that are difficult to ascertain correctly without extensive training.

The new generation of computers (Tablet PC's and Pocket PC's) combined with searchable database known as "Active Server Pages" (ASP), offer new opportunities for quick and rapid identification of species. For this project, I will develop a revolutionary method of faunal and floral identification that surpasses traditional identification techniques. This method will be based on ASP programming and will be usable on the World Wide Web and as a portable identification system that can be carried easily into the field via Pocket and Tablet PC's. The proposed work will be carried out in collaboration with Mur Muchane, Davidson's Director of Instructional Technology. Davidson's Instructional Technology Group recently acquired 15 new Fujitsu Stylistic Tablet PC's as part of a pilot project to explore the potential to enhance teaching, learning, and research with these devices. With pen-based input and robust handwriting recognition, Tablets represent a promising new frontier in educational computing.

Part of the Project to be Done Under ACS Funding

The vast majority of this project will be conducted using ACS funding. I will develop a model system using snakes of North Carolina. Snakes are commonly seen by students during biotic surveys of areas around Davidson and are often misidentified. Proper identification is required for all vertebrate surveys conducted both as part of classes and student research and is especially important when identifying venomous (i.e., potentially harmful) species. The method I develop will allow identification of snakes without the need to capture venomous species (Davidson students are instructed to leave all venomous snakes alone when in the field). Although this technique will first be applied to snakes, later expansion to other groups of flora and fauna will be based on the same techniques.

Methods

To use ASP, web pages are used to query a database of characters and then produce results that are useful to the user. Davidson Instructional Technology Group personnel have an ASP expert on hand who will help with development of the code. We will develop a database of snake characters that are easily recognizable by students. This database will be in the form of a matrix (character X species). The matrix will be the foundation of the database that is queried by

the webpages. Students will select check boxes for various character types including habitat, behavior, size, shape, color, pattern, and geographic range. The database will then produce a dataset that has all the species that match the criteria selected by the student. For each species, an image will provide visual verification and will be hotlinked to our “Herps of North Carolina” webpage where the students can find out more about the particular species (<http://www.bio.davidson.edu/ncherps>). This method will be far superior to the traditional techniques of field guides and dichotomous keys because it will take advantage of the query capabilities of ASP and the use of multiple, easy to use characters. Once the details of the methods are worked out and this system is tested, matrices of other faunal and floral groups can easily be developed and incorporated into the code. An explanation of the technique and the ASP code will be made downloadable via the web. All faculty studying organismal biology at ACS schools will be contacted and made of aware of the resource.

Timeline

Spring 2004 - Initial development of simple matrices (i.e., only venomous species). Develop organization of the database based on consultation with Davidson IT personnel.

May-June 2004 – Expansion of matrix to include all species of snakes in North Carolina. Development of ASP code to query the database. Testing use on the internet and use in the field on Tablet PC’s and Pocket PC’s.

July 2004 – Refinement of webpages produced so that they are user friendly and link properly to “Herps of North Carolina” website.

August 2004 – Posting of the code and technique explanation on the web. Email announcement of availability to appropriate colleagues at all ACS colleges.

Fall 2004 – Spring 2005 – Matrices of other floral and faunal groups will be incorporated to suit needs of various courses (see below).

Technology: Technical Requirements for the Project

Requirements for this project include two main things:

- 1) Expertise in the floral or faunal area being worked with – the PI has the required expertise.
- 2) Expertise in ASP programming – Davidson Instructional Technology Group has expertise with this and has already agreed to assist with this aspect of the project.

Other Support: Institutional and/or Outside Support for Project

Davidson College will provide all hardware and software necessary for this project. Additionally, the Biology Department at Davidson College will provide the server space necessary and the time required by a server administrator.

Learning Outcomes: How the Project Will Enhance Teaching/Learning

This project will enhance teaching and learning by allowing students to quickly identify flora and fauna while in the field, thus providing them with the basics needed for completing biotic surveys. These surveys are required for several classes (Introductory Biology, Vertebrate

Field Zoology, Amphibian and Reptile Conservation, Botany, Invertebrate Biology, Dendrology).

Curriculum: How the Project Will Be Integrated into the Curriculum

This project will first be developed using snakes as a model. Then additional faunal and floral groups will be added. As more and more groups are added, additional courses will make use of the ability to identify easily animals and plants in the field (see above).

Assessment: How the Project Will Be Evaluated

This project will be evaluated in three distinct ways. First, the identifications of students using traditional techniques (field guides, dichotomous keys) will be compared with those using the new ASP based identification techniques. Correct and incorrect identifications will be compared between the two groups and the time required for proper identification will be measured. Second, colleagues who are experts in the study of particular floral or faunal groups will be asked to use the software and suggest ways in which it can be improved. Finally, after it is disseminated to other ACS Colleges, input via the internet will allow refinement of the software.

Dissemination: How the Project Will Be Shared with ACS Colleagues

This project will be disseminated in three ways. Once the software is developed and initial testing has been done, an email announcement will be sent which will direct interested colleagues to a website describing the technique and making the customizable software freely available. This announcement will be sent to all appropriate colleagues of all ACS schools. Additionally, a paper describing the technique and evaluating the technique will be written and submitted for publication to a pedagogical journal. The project will be shared via Davidson's Instructional Technology seminar series, and Dorcas and Muchane will be available to present via an ACS IT workshop