SOME TECHNIQUES AND CONSIDERATIONS IN DEVELOPING WEB-BASED EDUCATION MODULES IN WILDLIFE DAMAGE MANAGEMENT

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Abstract: The Internet presents a unique opportunity to present and promote the principles, methods, and techniques of wildlife damage management to the viewing public or to select audiences, such as elementary to secondary students. This paper describes how different software programs (Macromedia Flash™ and Director™,) and different techniques (Java Applets, scripts, and animated Gif images) are used to create an interactive and visual experience on the Internet. This paper suggests elements in web design that are attractive to youth audiences and describes the general limitations of web-based education.

Key words: computer, elementary education, Internet, module, secondary education, vertebrate pest management, web, wildlife management

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INTRODUCTION

Web-based learning for elementary and secondary age students has grown steadily as educators have acquired greater access to computers in their classrooms and in school-based computer labs. More than 75% of all US students have access to computers at school (Becker and Anderson, 1998). According to one study, "close to half of all students use computers at school in some way at least several times per week" (Becker, 2000). Ninety percent of children between the ages of 5 and 17 (or 48 million) now use computers. Children and teenagers are more likely to use computers and the Internet than any other age group. (US Department of Commerce, 2002)

Computer use as part of school assignments has evolved in recent years. Instruction in keyboard use and mouse skills is common in elementary grades and spreadsheet use is common in secondary education. Educators now regularly require students to locate and collect web-based information. Educators must concomitantly instruct students how to effectively glean and evaluate web-based information if they are to successfully use the Internet as a research tool.

Learning modules can be used as an approach to teach scientific concepts, techniques, and applications. Modules can also be used to guide students through steps in an on-line research project. In the latter case, some modules have been created by elementary educators or school districts to create a scientific approach to on-line learning and to improve Internet literacy. In other modules, instruction within a scientific discipline has been designed by professionals in agencies, universities, and other non-profit groups.

We believe the best modules include

activities, such as interactive games, virtual field trips, puzzles, and word or image scrambles that are interwoven with text documents and test instruments, to create a unified system of learning. Learning modules should include specific learning objectives and lesson plans for educators or parents. They should also address learning standards established by school districts, accrediting organizations, agencies, or national programs administered by the US Department of Education. A well designed web-based module can be more attractive to most learners than standard text books or, even in-class activities because of its interactivity, color, and overall aesthetics.

Content development and design of a web-based learning module should go hand-in-hand. The design team must decide early in the development process if the module will be entirely web-based or if supplemental information, such as textbooks, workbooks, or reference materials, will be used. Also, a decision must be made if all activities that support key learning objectives will be performed on the web or if some activities will be designed as downloadable or printable, with work being performed by the user off-line. The design team must also decide whether the web module will be a stand-alone module or part of a larger web site with other modules.

The first step in designing content is to select the unit of study. Select a concept that is narrow enough in scope so that you have enough resources to address all learning objectives and each specific objective has at least one activity associated with it. For example, a unit of study may address a particular concept in wildlife damage management, such as Integrated Pest Management, or it may address a particular species or group of species with similar management implications.

The next step is to decide which type of activity is most suitable for the learning objective. Online activities have the most interest but may not always be appropriate. For instance, if you want the user to develop a vocabulary of terms, an online activity might include an interactive crossword puzzle with a set of choices. A crossword or word scramble that can be printed offline, however, may be more suitable and take far fewer resources for the designer. In general, mazes, crossword puzzles, and scrambles of words or images have little utility in science but may have applicability in developing motor, memory, or spelling skills or in building vocabulary.

Interactive games, such as multiple choice or matching exercises, can be a novel way to promote competency in complex subjects or concepts. For instance, to develop the concept of using an integrated approach to beaver management, a series of animations could be created that allow multiple choice selections, each with its own set of conditions, defined by images or text. Each answer selected could take the user to a set of consequent circumstances or conditions that would be used in making the next selection in the interactive animation

The designer of the interactive game must decide if images of real animals, habitats, animal sign, or natural scenes should be included or if such images can be better and more simply constructed by the designer. Real life images may have larger file sizes but require far less development costs to include in an animation. We suggest that such images be used if the exact appearance of a real life image is important to the learning objective and if images clearly and simply depict the desired effect. Designers can typically develop simple representations of real life that do not detract from the concept being portrayed in the animation.

Some layout of the interactive game, such as a story board, which chronicles the

successive images and text as they appear, should be used. A simple sketch of text and graphics for each page as it appears in the "story" or game should also be made at this time.

Interactive games should provide positive feedback for correct or best choices and explain the implications of selecting an incorrect or less-favored choice. Timed events are useful to challenge self-motivators but should be designed as optional. Similarly, rewards can be placed within online activities that lead the user to a higher level of play or allow the user to enter another activity or portion of the website.

The software to create interactive games should match the abilities of the designer. The designer could be the author or manager of the web site, a specially trained employee or student worker, or the design could be outsourced to another organization or individual. We suggest that you select software that is commonly available and has players or plug-ins that are widely used and applicable across platforms and browsers. Some examples are Flash™ and Flash Player™ by Macromedia© and Director™ and Shockwave™ (player) by Macromedia©. Some software, such as Director™, are useful if you plan to design for both the Internet and for other formats, such as CD-ROM and DVD-ROM. If the designer is proficient in JavaScript or another computer language, you might select software that uses these to enhance the effects of the animation or game. Other software that creates or modifies animated gifs, such as Coffeecup at http://www.coffeecup.com, can be used to support more complicated animations created in Flash™.

Java applets, animated gifs, and "rollovers" to create interactive buttons are other features that bring interest to the web site. These, alone, however, cannot offer the interactivity and complexity sufficient to create an online game. Too much animation at different locations within a web page can distract from, rather than direct the user to online activities. A simple design using Flash™ by Macromedia© can be used to create an interactive cartoon-like animation. The designer can illustrate a specific principle, such as identification of a wildlife species before selecting a control method or a specific process, such as creating a particular trap set. An animation that lasts only two minutes and contains ten successive on-line screen views can cost well over $1,000 at 2003 prices.

When designing activities, it is important to keep in mind that users expect the Internet to be a visual and interactive medium. Students do not expect to download and print activities. Educators are also less likely to use activities that need to be printed as there are typically fewer printers in classrooms or labs than there are computers. If designing an off-line activity, be sure to create a compatible format and style for most printers, keeping the graphics and color to a minimum.

The aesthetics and ease of navigation of web-based module are as important as the content. We offer the following as a collection of useful references in web site design and offer the following suggestions:

Useful References

Web Wisdom: How to evaluate and create information quality on the web by J.E. Alexander and M.A. Tate, Lawrence Erlbaum Associates, Mahwah, New Jersey, 1999.

Web Design in at Nutshell, A desktop quick reference by J. Niederst, O'Reilly, Sebastopol, California, 1999.

Web Style Guide: Basic design principles for creating web sites by P.J. Lynch and S. Horton, Yale University Press,

New Haven, Connecticut, 1999.

Outfront Webmasters, by Thomas Brunt at http://www.outfront.net

Overall Design

The web site should be no more than four to five pages deep.

No page should be a dead end.

Each page should have navigation.

Navigation is best observed through buttons or text and not images or image maps.

A header graphic and the main navigation bar should appear at the top of the home page and each section page.

A subsidiary navigation bar may be needed (usually placed vertically along the left hand margin) for each page within a particular section of pages within the web site.

Related web sites should not be linked within the navigation bars.

No more than three clicks should be able to take the user from an activity back to the Home Page.

Use a single layout design for successive pages of a game to create consistency, placing text and images at locations on the page where users expect them to be.

Use small sizes of images or thumbnails to keep download times to a minimum.

Do not create pages whose download times exceed ten seconds.

Create preloaders for pages or interlaced gifs or progressive jpegs for graphics that require a long time to download.

Links on Pages should be apparent and descriptive

Mouse roll-over information or alt tags are recommended for menu items and links.

If external links are used, the user should be made aware of safety or liability issues.

Home Page

Include a brief description of the mission, authors, and sponsors of the web site.

A brief description of the design of the web site, related web sites or modules, and a link to the Site Index.

If personal information that identifies the user is being collected (first and last name, home address, school name, social security number, telephone number, etc.), a parental consent form should be made. The consent form should be verifiable with the parent or guardian's signature and date.

If graphics are very large, link to a Text Only version of the web site.

Include links for educators and parents, including links to any accrediting agencies or web site evaluators.

Other Pages

Each page should have an identifying logo, that by clicking on it, returns the user to the home page.

Methods of increasing the safety of children that are using Internet have been widely debated. Parents and educators should be made aware of the relative risks involved in using your web site. Check with the general counsel office of your agency or university or with a lawyer to determine if your web site is regulated by either the Department of Education (Children's Internet Protection Act) or the Federal Trade Commission (Children's Online Privacy Protection Act of 1998, Title 13). If you need to collect and analyze personal information of users (such as full name, home address, telephone or social security number, or school name), some regulations may apply. Parental consent forms are a good idea even if regulations are not applicable to your situation.

Web-based learning modules are commonly used by educators to teach only a portion of a unit of study, because of the limited number of web sites available in a specific subject matter. The limited number of learning modules is, in part, due to the numerous resources needed to create a

learning module. Design costs vary considerably, depending upon the ability of the designers and their level of interaction with the design team. If you are not the designer, be sure to interact with the designer throughout the design stages.

Educators have the responsibility of concomitantly instructing youth in critical thinking skills, information literacy, and in safety issues associated with computer use. Designers of web sites for youth have similar responsibilities. An inherent objective of any web-based learning module should be to develop the users competence to find, retrieve, analyze, evaluate, and use web-based information. For a module that requires the user to perform a web-based search, the designer might direct the user to selected websites, giving supporting rationale for the selections. Another design strategy may be to describe the search parameters. Modules might also depict the stepwise progression of the scientific method.

Marketing your web-based module can be done in a variety of ways. One of the simplest is to design the web site to be self-marketed by allowing a quick link for the user to e-mail the web site address to a friend. You can also send your web address to magazines, such as *PC World* or *PC Magazine* that list their favorite web sites. Consider sanctioning by a website evaluator. The American Library Association (http://www.ala.org/alsc/ncwc.html) , blue webn (http://www.kn.pacbell.com/wired/bluewebn/search.html, or Wired Kids at http://www.wiredkids.org, offer their seal of approval on selected web sites. Evaluators select the websites based on their safe design of content and their educational significance. You can also use direct marketing to web sites operated by state or local entities. State wildlife agencies, county parks and recreation departments, zoos, nature centers, and municipal animal control or wildlife rehabilitation centers, often have their own web sites. Lastly, don't forget to market your website through other media. Often, the agency responsible for wildlife management in a state publishes a magazine directed at youth. Fliers distributed at agricultural expos, state fairs, science fairs, hunter safety courses, conservation organizations, Boy Scout Council offices, and county extension or 4-H offices can add to the exposure of the website.

Disclaimer: mention of commercial products does not constitute endorsement, nor does omission constitute criticism.

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