

BURNING ISSUES: PARTNERS IN FIRE EDUCATION—"FIRE LITERACY FOR A FIRE WISE WORLD," PART 1: DEVELOPING AN INTERACTIVE CD-ROM AND DISTRIBUTION STRATEGY

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1. INTRODUCTION

The U.S. Department of the Interior's Bureau of Land Management and Florida State University combined expertise to develop a highly interactive multimedia science program designed to help middle and high school students to learn about the role of fire in ecosystems and wildland fire management practices. *Burning Issues* challenges users to learn about prescribed burns, wildland fire suppression, the relationship between fire and invasive plant species and fire-wise concepts used in the urban-wildland interface. This paper describes the rationale for developing such a program, explains how the program was designed and gives an overview of the program's content.



Introductory screen to interactive program

2. DESIGNING EFFECTIVE INSTRUCTIONAL MATERIALS

Over the last two decades, most schools in the United States have experienced dramatic changes in pedagogy and these changes have dramatically impacted the teaching and learning of science.

The traditional textbook and lecture approach to teaching is rapidly being replaced with "hands-on, minds-on" instructional strategies bolstered by large doses of technology. There is a plethora of studies documenting the positive effects of using technology to increase student interest and achievement in science. Organizations and agencies that view K-12 public education as a stakeholder in their environmental education efforts are increasingly aware of the demands of the traditional curriculum and the new demands imposed by federal, state and local standards or mandates. To have programs used in today's classrooms, developers need to offer more than printed lesson plans, posters and not-too-exciting videos.

Effective instructional materials should be designed to assist teachers teach science using inquiry to develop intellectual skills, cooperative learning, technology integration and problem solving. Our approach is to design materials that emphasize teaching strategies which encourage sense-making in a collaborative environment. These materials encourage teachers to use problem-centered learning as an alternative to traditional explain and practice methods. Rather than memorizing seldom used scientific terms, rules and definitions, students use inquiry to collect and analyze data from scientifically designed, real life experiments that have relevance to the world in which they live. We create simulations that mimic reality and real science and encourage risk-taking. They allow students to make mistakes without being threatened. These programs use the power of interactive technology and meaningful experiences to develop problem-solving skills. Along the way, program-users learn why and how science is an integral part of their daily lives. Teachers and students are over-burdened with layers of standards; they are tested to near-death and already have "too much to teach," so new

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instructional programs must help teachers do a better, more efficient job of teaching and helping students learn more science process skills and content that compliments national, state and local science standards.

3. THE DEVELOPMENT PROCESS

Nothing good happens over night. Interactive multimedia programs require months to design, re-design, review and redo. Patience is essential. **Burning Issues** took over 18 months to design, develop, field test and revise. Fortunately the program developers at Florida State University's Interactive Media Science Program had experience with other programs including the National Science Foundation's supported **ScienceVision** and the award-winning aquatic ecology program **EcoVentures**. These projects helped us identify classroom teachers, graphic designers, videographers, writers and content specialists needed for a team that could complete complex tasks in a timely manner.

3.1 Working With A Technical Advisory Committee

The entire development process was guided by a Technical Advisor Committee (TAC) that had content expertise and experience in environmental science education or technology integration. The TAC never met as a group but shared comments, concerns and criticisms with staff and other members of the Committee via email. The contributions of the TAC cannot be understated.

3.2 EcoVenture Organization

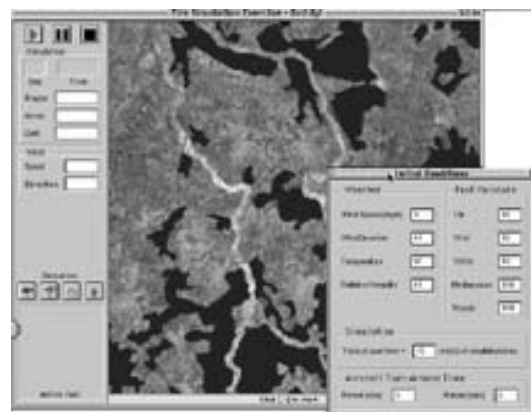
Major decisions, such as the location of the interactive activities, were first proposed to the funding agency and once approved, a senior staffer developed a verbal description of the activity for the team to review, revise and extend. Each EcoVenture (interactive, on-line activity) consisted of four inter-related parts:

- A short introductory movie that explained the EcoVenture and challenged users to help develop a

solution to a science-based problem;

- A movie featuring a site consultant that answers questions potential users might have as they work through the activity;
- An EcoVenture that requires users to develop a hypothesis, gather data, explain results and make conclusions in the form of management recommendations;
- A chapter in the Student Field Notebook containing an introduction and clearly stating the objectives of the EcoVenture and its importance, guide questions for users to answer as they attempt to complete the activity and finally, questions that help users make conclusions based on the data they collected. The Student Field Notebook helps teachers assess student progress, identify problems and provide feedback. And yes, there is an Educator's Guide that contains suggested answers and suggestions for using the program.

Each of these components is carefully correlated with all the other components and made consistent with the mission and objectives of the overall program design. This process continued until all four EcoVentures and the summation activity, FLAMES, were completed.



Sample screen for FLAMES program

3.3 Internal Review

Internal review helped improve the program. For example, the original

EcoTour was a flat screen with just a few images of animal and plants. After staff review, we learned that new software was available that could make the EcoTours a realistic, panoramic, scrollable 360 degree view of the ecosystem enabling us to give the user a better picture of the habitat and include 20 to 30 organisms that are commonly found in the area. Clicking on an organism connects users to a close-up photograph and a field guide-like description of the organism and how fire affects it. It was input like this that helped us improve the program right up until the time we “burned” the field test copies of the disc. Field testing instructional programs is essential to program success. Involving classroom teachers in the development process reduces the need for elaborate field testing but it does not eliminate it.



Sample screen: southern pine location

4. ECOVENTURES AND FLAMES

“Fire Power” takes place in a southern pine location and helps users learn the conditions and management considerations to safely and effectively prescribe fires. This was the original EcoVenture dealing with fire and appears in its original form on **EcoVentures: Focus On The Gulf** program. Its original intent was to help students learn the relationship between managing uplands and water quality in a watershed. Impacts on forests received more emphasis in the current version. “I-Zone” introduces the concept of an urban-natural area interface and the special problems these areas create. Users are challenged to develop a fire-wise building from common construction materials in a chaparral ecosystem.. “Fire Suppression”

takes place in a ponderosa pine ecosystem and introduces users to different strategies for suppressing unwanted wildland fires. “Golden Eagle” challenges users to examine how fire affects the relationships among predators, prey and invasive plant species. It takes place in the shrub-steppe ecosystem.

“FLAMES” is the summation activity that challenges users to apply what they have learned about wildland fire to new fuels, varying wind speeds and sometime random conditions that may or may not happen during real fire fighting situations. FLAMES was adapted from an actual training program for fire managers and has 12 different lessons. Some are easy, some are very difficult but all of them are exciting simulations of what can happen when “unknowns” are introduced to a wildland fire scenario.

5. OTHER PROGRAM COMPONENTS

Although the EcoVentures and FLAMES activities are the heart of the **Burning Issues** program, the CD contains other useful elements. The Resource Room contains a Field Guides that help users learn more about the organism that inhabit the ecosystems visited during the EcoVentures.



Sample screen: resources available include picture and description of species

There is also an interactive glossary that defines and illustrates key words and fire management concepts. Over 350 pictures and text boxes are available from the Resource Room. Consultants including Drew Houseman, Flora Good-Burns, Leo Badger, Pat Deland, and Rollin Hills are accessed from the Resource Room.



Consultants are available to answer questions

If program users are web-connected, they can go directly to the FIREWISE website to get additional information on fire-wise principles and techniques. Last but not least, the CD includes two important print components; the Student Field Notebook which helps users navigate the program and think about what they are learning and the Educator's Guide which gives teachers suggested answers for assessing student progress.



Student's field notebook allows students to see the value of taking written notes in the field.

6. CONCLUSIONS AND RECOMMENDATIONS

While the subject of *Burning Issues* is fire ecology and wildland fire management, the program was purposefully designed to appeal to science teachers because it emulates good science. The content and pedagogy was carefully reviewed by scientists, wildland fire experts, instructional designers and classroom teachers. The program was field-tested in a variety of learning environments and modified based on the results. The actual development was done by an experienced team that interacted with each other and with a Technical Advisory Committee.

There are a growing number of CD programs available to teachers. Some are just videos on a CD; some have navigational buttons that lead to talking heads discussing this issue or that problem. Few are truly interactive and even fewer use scientific inquiry as the underlying basis for their design. Creating effective instructional programs requires time, effort, patience and a clear view of whom, why and how the final product will be used.

