



USABILITY ANALYSIS

of the

EPA Environmental Education Center Web Site

<http://www.epa.gov/teachers/>

[Text](#)

EPA United States Environmental Protection Agency

Welcome to EPA's
ENVIRONMENTAL EDUCATION CENTER

- Background Information
- Curriculum Resources & Activities
- Community Service Projects
- Workshops & Conferences
- Student Jobs & Scholarships
- Awards
- Grants
- Contacts & Other Links

About EPA
Environmental Laws
Dictionary
Index
In the News
Kids
Publications
Students

Home Search Comments

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Usability Analysis of the EPA *Environmental Education Center* Web Site

<http://www.epa.gov/teachers/>

EXECUTIVE SUMMARY

This report evaluates the usability of the *Environmental Education Center* Web site (www.epa.gov/teachers/), an environmental education site for primary and secondary school teachers and other educators, developed by the Environmental Protection Agency (EPA). The report presents the results of a combined effort by the EPA Office of Environmental Information (OEI), the EPA Access Workgroup, and Princeton Energy Resources International (PERI) to assess the *Environmental Education Center*, identify concerns or “trouble spots,” and present recommendations to help guide further development of the site so that it provides the information that the user wants through a system that is easy to understand, easy to remember, and subjectively pleasing. The OEI served as the lead office for this effort.

The *Environmental Education Center* site provides links to EPA Web sites, other Federal Web sites, and sites sponsored by Federal agencies that provide environmental information on environmental issues, curriculum development, and classroom activities, as well as environmentally-related community service projects, workshops, grants, student jobs, and other subjects. It is one of a trio of EPA environmental education Web sites, which also include the *Explorers’ Club*, for children ages 5 to 12 and the *Student Center*, for middle and high school students.

All three sites are portals: they provide the structure and framework to enable users to locate age-appropriate Web sites covering a wide range of environmental topics. The EPA Access Workgroup is responsible for maintaining the three sites and has developed criteria for evaluating EPA and other environmental Web pages to determine if they are appropriate for inclusion in one or more of the portal sites. The Workgroup is a component of the EPA Environmental Education Advisory Board and includes environmental education coordinators and Web designers from several EPA headquarters and regional offices.

The approach for evaluating the usability of the EPA *Environmental Education Center* involved the following three-step process.

- A *Primary Assessment*, or “expert review,” of the site, where an experienced Web site reviewer evaluated the *Environmental Education Center* in terms of broadly accepted usability criteria, including the site’s accessibility, form and functionality, and content;

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- A *User Test* evaluation, in which “typical” teacher users were observed as they completed a series of task questions and took part in focus group discussions about the site. Two user test sessions were conducted. The first group comprised five teachers from Sandoval Elementary School in Chicago, Illinois (which includes students up to grade 8), and the second session included three teachers from Woodrow Wilson High School in Washington, DC; and
 - An *Analysis*, where the results of the primary assessment and user tests were synthesized and assessed, and recommendations for enhancing the *Environmental Education Center* Web site were developed.

The EPA *Environmental Education Center* provides access to a wide variety of environmental information for educators. Overall, the teacher test participants commented that the site is attractive, with pleasing graphics and colors, and that it contains a wealth of useful information. For example, they commented that:

“There is a wealth of information.”

“It’s a major resource for environmental information.”

“I would use it as a cross-curriculum resource.”

“The Dictionary is nice.”

“I would like to come back for community service projects.”

“I really like the graphics, pictures, etc.”

“It is well set up.”

“Easy to navigate.”

“Offers a different array of topics than the student site.”

“Graphics are clear, good color, not tacky.”

“It’s attractive.”

On the other hand, the middle school teachers successfully completed only 40% of their task questions and the high school teachers completed only 46%. They frequently experienced problems navigating the site and some teachers thought that some of the linked sites contain too much information, which was presented in a confusing manner. In addition, the *Environmental Education Center* is very difficult to find from commercial search engines and from the EPA home page. Some of the teachers’ comments include:

“It was tough to find the path to the answers... the difficulty in understanding is due to the layout.”

“The information was ridiculously difficult to find... I have no clue where to look.”

“Put key words in bold lettering and in color.”

“It was very tough to find the site directly from the EPA home page.”

“It wasn’t instinctive to look under ‘Audience Groups’ (on the EPA home page).”

“Language needs to be straight and to the point.”

“Needs less text and heavy explanations.”

Expert review and user testing revealed a number of ways to improve the *Environmental Education Center* Web site. We reviewed the site according to nine distinct usability criteria and scored each of 50 key indicators of these criteria based on whether it is of “No/Limited Concern,” “Moderate Concern,” or “Major Concern.” Based on this analysis, we identified 13 areas of major concern, 17 areas of moderate concern, and 20 areas of no concern. We then developed the following recommendations to address these concerns about the usability of the *Environmental Education Center* Web site:

Increase User Accessibility to the Site.

Five of the 13 areas of major concern involve site accessibility issues. Site accessibility can be improved by registering with more commercial site engines and/or educational Web sites, marketing the site to schools and educational organizations, ensuring that links to the site are included in other EPA and Federal environmental education sites for teachers, and improving visibility on the EPA home page.

Revise the Structure of the Home Page and Subsequent Pages.

Seven of the 13 issues of “Major Concern” relate to problems of navigability and site structure. A key to improving the site structure is to provide an alphabetical index of environmental topics. A number of other improvements should also be made to the site structure that will enhance the site’s navigability as well as the visibility and understandability of the objects, actions, and options on the site. These include, for example, reorganizing the left side-bar, adding an “*Environmental Education Center Home*” button above the left side-bar, adding navigational links to the bottom of

each page, and providing more visible links to the EPA *Student Center* and Environmental Education sites.

Improve Site Navigability.

Add a site overview, improve the site map and search engine, and review the site regularly for bad links.

Clarify Terminology.

Define terms when they are used in the text and consider linking technical terms used in the text to their definition in the glossary.

Improve Site Consistency and Standards.

Review the site periodically to ensure that all features are consistent and that none is missing. Ensure the site adheres to the Internet convention on the color of viewed links. Ensure that linked sites are categorized appropriately. Maintain consistency with the EPA *Student Center*.

Enhance Site Design.

Ensure the left side-bar is visible when it is printed.

Enhance User Control/Help.

Add “Return to *Environmental Education Center*” frames to all linked sites. Remind users they can contact EPA for help. Review site for “Exit EPA” markers.

Assess Accessibility to Disabled Users.

Ensure that all non-text features have alternative text markers. Delete or update text version of the site. Review the site based on EPA guidelines for accessibility and using an accessibility software program.

Evaluate Technical Problems.

Investigate problems downloading the side-bars to see if they recur on other computers. Investigate occurrence of advertisements on linked sites.

Add Content.

When considering new sites, select ones that are clearly organized, easy to comprehend, and do not provide an overwhelming level of detail. Look for additional sites that provide more: bilingual information, teacher resources (e.g., field trip ideas, videos, speakers, books), information on student jobs and internships, science experiments and hands-on activities. Add short descriptions of each main subject/topic, add key descriptors to descriptions of linked sites, and revise or delete the “Contacts & Other Links” section.

Review the Site for Accuracy.

Periodically review the site for grammar and spelling errors and continue the on-going process of carefully evaluating sites before adding them to the *Environmental Education Center*.

Perform Additional Usability Testing.

Perform user testing on prototypes that incorporate the recommended changes, in particular a revised site structure. Include a task asking participants to locate the *Environmental Education Center* from the revised EPA home page. Perform expert review and user testing on EPA Web sites that are potential candidates for inclusion in the *Environmental Education Center*. The results can be assessed in relationship to the Access Workgroup's Web site evaluation.

1.0 BACKGROUND

The Environmental Protection Agency (EPA) has developed a series of three environmental education Web sites:

- *Explorers' Club* for children ages 5 to 12;
- *Student Center* for students in middle school and high school; and
- *Environmental Education Center* for teachers and other educators.

All three sites are portals: they provide the structure and framework to enable users to locate age-appropriate Web sites covering a wide range of environmental topics. The EPA Access Workgroup is responsible for maintaining the three sites and has developed criteria for evaluating EPA and other environmental Web pages to determine if they are appropriate for inclusion in one or more of the portal sites. The Workgroup is a component of the EPA Environmental Education Advisory Board and includes environmental education coordinators and Web designers from several EPA headquarters and regional offices.

This report evaluates the usability of the EPA *Environmental Education Center* (www.epa.gov/teachers/). It is one of three reports that present the results of a combined effort by EPA Office of Environmental Information (OEI), which served as the lead office, the EPA Access Workgroup, and Princeton Energy Resources International (PERI) to assess the usability of the three Web sites, identify concerns or “trouble spots,” and help guide further development of the sites. Aimed at kindergarten through high school teachers, the *Environmental Education Center* provides links to EPA Web sites, other Federal Web sites, and sites sponsored by Federal agencies. It provides environmental information on background issues, curriculum development, and classroom activities, as well as environmentally-related community service projects, workshops, grants, student jobs, and other subjects.

2.0 APPROACH

The approach for evaluating the usability of the EPA *Environmental Education Center* Web Site involved a three-step process. We first performed a Primary Assessment in which we evaluated the usability of the site in terms of its accessibility, form and functionality, and content. Next, we performed a User Test evaluation, where we assessed the success of respondents in using the *Environmental Education Center*. Finally, we analyzed and synthesized the results of our primary assessment and user tests and developed recommendations for improving the *Environmental Education Center* Web Site. This approach is described in more detail below.

2.1 Primary Assessment

The Primary Assessment involved an “expert review” of EPA’s *Environmental Education Center* Web Site in terms of several usability principles. An experienced Web site reviewer evaluated the site according to its accessibility, seven major criteria related to its form and functionality, and to a more limited extent, the content of the portal site and its linked sites.¹ These usability criteria are described in Exhibit 1.

2.2 User Tests

The results of the primary assessment were used in conjunction with EPA

Exhibit 1 – Primary Assessment Usability Criteria

Site Accessibility	The site should be quickly and easily accessible from commercial search engines and the EPA home page.
Form and Functionality	<p><u>Navigation and Visibility</u>: the site should always keep users informed about where they are and where they can go.</p> <p><u>Recognition Rather than Recall</u>: all objects, actions, and options on the site should be visible and broadly understandable.</p> <p><u>System/Real World Match</u>: the site should speak the user's language.</p> <p><u>Consistency and Standards</u>: users should not have to wonder whether different words, actions, or situations mean the same thing.</p> <p><u>Aesthetic and Minimalist Design</u>: the site should not contain information that is irrelevant or rarely needed.</p> <p><u>User Control and Help</u>: the site should help users recognize, diagnose, and recover from errors; help information should be succinct and easy to search.</p> <p><u>Accessibility to Disabled Users</u>: the site should be accessible to people with disabilities.</p>
Content	<p><u>Purpose/Target Audience</u>: the purpose of the site and the audience from whom the site is intended should be apparent.</p> <p><u>Coverage</u>: the breadth and depth of the site's content should be appropriate to the site's purpose and target audience.</p> <p><u>Accuracy</u>: the site should provide information that is accurate and free of errors.</p>

¹ Based on Jacob Nielsen’s ten usability heuristics and an extensive literature review of human factors research and web design. (See Keith Instone, “Usability Heuristics for the Web,” <http://webreview.com/WR/pub/97/10/10usabiiti/sidebar.html>.)

input about goals and objectives for the site to create a tasking guide consisting of an entry questionnaire, a set of task and focus group questions with observer notes, and an exit questionnaire. The guide was administered to five teachers at Sandoval Elementary School in Chicago, Illinois (which includes students up through 8th grade), and three teachers at Woodrow Wilson High School in Washington, D.C.

Exhibit 2 summarizes test participant characteristics, including their previous experience with the Internet and the EPA *Environmental Education Center*. As shown in the exhibit, most of the teacher participants reported being relatively experienced with the Internet. Five of the eight participants said they are intermediate-level Web users, two said they are advanced-level Web users, and only one reported to be a beginner. All eight teachers use the Internet at least once a day, and two of the eight had used the *Environmental Education Center* previously.

At each school, teachers were asked to complete an Entry Questionnaire. An EPA moderator then led the participants through an elicitation process designed

to evaluate the user's success in navigating the *Environmental Education Center* Web site, and ensure that all users saw and experienced a certain number of similar aspects of the site. The moderator first asked a focus group question about the participants' preferred methods of searching for environmental information for curriculum planning. Next, the moderator asked the participants to complete tasks to find specific

Exhibit 2 – EPA *Environmental Education Center*: Participant Characteristics

Characteristics		Sandoval Elementary School	Wilson High School	All Teachers
Grade	4th	1	0	1
	7th	1	0	1
	8th	2	0	2
	High School	0	3	3
	Computer Lab	1	0	1
WWW Experience	Beginner	0	1	1
	Intermediate	4	1	5
	Advanced	1	1	2
Frequency of WWW Use	Greater Than or Equal to Once/Day	3	1	4
	Less Than Once/Day	2	2	4
	Once/Week	0	0	0
	Less Than Once/Week	0	0	0
Typical Connection Speed	Slow	0	2	2
	Medium	0	1	1
	Fast	3	1	4
Previous Use of <i>Environmental Education Ctr. Site</i>	Yes	2	0	2
	No	3	3	6

information on the Web site. The questions were similar in terms of type of information and task, but were tailored to be appropriate to the grade levels taught at each school. Time was available for the teachers at Sandoval to completed five task questions, while the Wilson High School teachers completed eight question. The session closed with a final focus group discussion seeking the teachers' overall impressions of the site, and a written post-test questionnaire.

During the focus group and task questions, an EPA or PERI observer sat with each teacher, recording the answers given by the participant, the path used by the participant to locate the task answer, comments, frustrations, technical difficulties, and/or problems the participant experienced.

Throughout the elicitation process, the moderator and observers encouraged the users to "talk out loud," expressing their opinions and perceptions as they surfed the site.

The entry and exit questionnaire responses, observers' notes, and participants' comments were summarized and evaluated based on the usability principles defined for the Primary Assessment. In addition, we assessed the *Environmental Education Center* site in terms of the participants' success in completing their assigned search tasks, and the occurrence of any "catastrophic errors" during the elicitation process. These evaluation criteria are described in more detail in Exhibit 3. A copy of the tasking guide and a summary of the participants' responses are provided in Appendices 1 and 2, respectively.

2.3 Analysis

Based on the results of the "expert review" and user testing, we prepared a narrative evaluation describing how well EPA's *Environmental Education Center* Web site meets each usability criterion and, for each criterion, scored relevant features of the site on a three-point scale (No/Limited Concern, Moderate Concern, Major Concern). This analysis is presented below in Section 3.0, "Portal Site Results." A summary evaluation of the Web sites that are linked

Exhibit 3 – User Test Evaluation Criteria

Usability Principles	Entry/exit questionnaires, observers' notes, and participants' comments as related to accessibility, form/functionality, and content criteria.
Task Completion	Were the users able to successfully complete the requested tasks? How much searching was required to complete each task? Was tangential or excessive searching/clicking needed to complete tasks? Did the users become disoriented or lost?
Catastrophic Errors	Did the users lose their Internet connection, get bumped off the site, lose interest due to length of time required to complete tasks or other reasons?

from the *Environmental Education Center* is provided in Section 4.0, “Analysis of Linked Sites.” Procedures for improving the usability of the *Environmental Education Center* were developed from these analyses (see Section 5.0, “Recommendations”).

3.0 PORTAL SITE RESULTS

This section describes our findings regarding the site accessibility, form and functionality, and content of the EPA *Environmental Education Center* Web site, based on analysis and synthesis of our primary assessment and user testing. A review scorecard that distills our findings and offers an easy benchmark for future assessments is also provided. This assessment focuses on the portal portion of the *Environmental Education Center*.

3.1 Overview

The EPA *Environmental Education Center* provides access to a wide variety of environmental information for educators. Overall, the teacher test participants felt that the site is attractive, with pleasing graphics and colors, and that it contains a wealth of useful information. On the other hand, they frequently had problems navigating the site and some teachers thought some of the linked sites contain too much detailed information, presented in a confusing manner. This section presents a brief overview of the user test findings based on the test participants' general assessment of the *Environmental Education Center* and ability to complete the task questions. A more detailed analysis, based on usability principles, is presented in the subsequent sections.

Task Completion

The teachers experienced considerable difficulty in answering the task questions. The Sandoval teachers successfully completed an average of two of their five tasks (40%). The number of correct responses per participant ranged from one (two participants) to three (two participants). The success rate for the Wilson teachers was slightly higher, with the teachers completing an average of 3.7 of their eight tasks, or 46% of their tasks. Of the three participants, two answered three of the eight task questions correctly, and one answered five questions.

The participants appeared to be relatively frustrated by their experience. The user test observers noted each participant's general attitude while completing each task. The observers reported that for all the participants and tasks, participants performed a task effortlessly only 18% of the time. They seemed annoyed, frustrated, and/or confused more than 30% of the time.

Despite the low success rate in answering the task questions and the relatively high feelings of frustration, the teachers' responses to the post-test questionnaire indicate that they do not think the site is difficult to navigate. Seventy-five percent of the teachers reported on their post-test questionnaires that they knew where they were when navigating the site and that information flowed logically all or most of the time, and 63% said it would be easy to find interesting infor-

mation on the site and that the home page is structured in a way to make it easy to find information all or most of the time. These responses suggest that either the teachers do not expect great success when looking for information on the Internet, or they did not want to admit that they had problems finding information on the *Environmental Education Center*.

The high school teachers found Task 7 (find an idea for a community service project for your students) to be the easiest question, with all three teachers successfully completing the task. All of the middle school teachers correctly answered Task 2 (find a site that provides EPA publications).

The most difficult task question for both sets of teachers was Task 5, where participants were asked to locate two sources of information on “global climate change.” This task was difficult for several reasons. First, it requires the participant to go to the both the “Background” and “Curriculum, Resources, and Activities” sections of the *Environmental Education Center*. However, during the entire user test, the teachers rarely went to the “Background” section to look for information. Second, the term “global climate change” (and even “global warming”), which is an important topic in current events, does not appear in the second-tier page for either section - the user must know that other terms, such as “air” or “ozone,” might lead him or her to information on global climate change. Finally, the term “global climate change” does not appear in any of the titles or descriptions of the linked sites in the “Curriculum” section.

Task 3 (look for information about environmental jobs and internships for your high school students) was also very difficult for the high school teachers - none of the three teachers could find helpful information. (The middle school teachers were not asked this question.) One teacher thought “the information was ridiculously difficult to find” and said she “had no clue where to look.” It was not clear to any of the teachers that they should go to the “Student Jobs and Scholarships” section of the site.

Technical and “Catastrophic” Errors

No catastrophic errors occurred during user testing resulting in loss of Internet connections. However, one or more participant experienced some type of technical problem during nine of the total number of 13 tasks. The more “typical” technical problems included long waits as pages were downloaded, broken links, and “transfer interrupted” and other error notices. In addition, the computers used by the high school teachers did not have Adobe Acrobat Reader, so they were unable to download PDF files, as required in one task question (that task was considered successful if the teacher found the link to the file). Three teachers were annoyed by on-line advertisements that popped up while looking at linked sites. In one case, these ads (one of which was for casinos) hindered

the participant's ability to quickly locate the answer to a task question. The casino ad appeared when the participant was attempting to log onto an air quality report from the EPA on-line publications site, prompting the teacher to comment that "it wouldn't be helpful for students to see this." The other advertisements popped up when a teacher was looking through non-EPA sites.

The only technical problem that was directly related to participants being unable to answer a task occurred on the high school computers, where the left side-bar did not load properly. Because the teachers could not see the side-bar, two of the three high school teachers were unable to complete Task 6 (find a site where you can search for EPA publications). This problem appears to be related to the computers used by the teachers, rather than the site itself, since it only occurred during user tests held at the high school. This conclusion could be tested by trying the *Environmental Education Center* site on different computers (including older computers) to see if the problem recurs.

3.2 Site Accessibility

Teachers and other educators should be able to easily find the EPA *Environmental Education Center* when searching the Internet for environmental information to use for developing classroom curricula or to assist students who are interested in pursuing an environmental career. We evaluated the accessibility of the site from commercial search engines and from the EPA home page.

Commercial Search Engines

It is important for a Web site to be quickly and easily accessible from commercial search engines. The teachers who participated in our user testing reported that their favorite commercial search engines include Google, Yahoo!igans, Yahoo, AOL, Monster Crawler, CNN, and MSN. Most also reported that if looking for information on environmental curriculum for their students they would use search terms that are related to the topic they are looking for (e.g., "ecosystem," "garbage," "recycling.")

PERI staff reviewed accessibility to the *Environmental Education Center* from five commercial search engines: Google, Yahoo, MSN, Lycos, and Monster Crawler.² For each search engine, eleven searches were performed using different key words and phrases commonly associated with EPA or environmental issues.

² These search engines were selected based on a combination of their overall frequency of use (see December 2000 Nielsen/Net Ratings (www.searchenginewatch.com/reports/netratings.html) and the search engines that are used by the test participants of all three environmental education Web sites.

Exhibit 4 – Commercial Search Engines Listing EPA Environmental Education Center and EPA Home Page by Search Criteria

Search Criteria	# Commercial Search Engines	
	Environmental Education Center	EPA Home Page
Environment	1	3
Environmental Education	1	1
Environmental Information for Students	1	1
EPA	0	5
Environmental Information	0	1
Environment, Student	0	0
Air Pollution	0	0
Ozone	0	0
Water Pollution	0	0
Recycling	0	0
Garbage	0	0

* Based on evaluation of five search engines.

Exhibit 4 displays, for each key word or phrase, the number of search engines that returned a listing for the EPA *Environmental Education Center* or for the EPA home page in the first twenty responses to a query.³ The only search terms or phrases that resulted in locating the *Environmental Education Center* were “environment,” “environmental education,” and “environmental information for students.” In each case, the site was found by only one of the five search engines. None of the search engines we tested led us to the EPA *Environmental Education Center* when we searched on the more commonly used search terms (e.g., “EPA,” “air pollution,” “recycling”).

While all five search engines found the EPA home pages when the search term “EPA” was used, only three located the home page when searching on the term “environment” and only one search engine located the home page when we used the terms “environmental information for students” or “environmental information.” It should be noted that many of the search engine/search term combinations led to other EPA Web sites, such as the Office of Water home page or the Ozone Depletion site.

These results indicate that it is very difficult for users to locate the EPA *Environmental Education Center* by using commercial search engines. Our user tests suggest that it is not common for teachers to include the term “student” or “environment” in their Internet searches, but these were the only search terms that led to either the *Environmental Education Center* or the EPA home page.

³ A search was considered successful if it resulted in a listing within the first 20 sites of the search results and brought the user to any page within the *Environmental Education Center* site. It was not considered successful if the link brought the user to the EPA *Explorers’ Club* or *Student Center*.

EPA has already taken some steps to provide site accessibility: the meta tags for the site include many typical search terms, including “air,” “water,” “recycling” and “pollution,” and the titles and text on each page also include key environmental terms. Several changes can be made to enhance accessibility to the EPA *Environmental Education Center*. For example, the *Environmental Education Center* should be listed with as many commercial search engines as possible. It might also be possible to contact major educational resource Web sites to see how to link the *Environmental Education Center* to these sites. EPA might increase awareness of the *Environmental Education Center* and EPA home page by marketing them (through mailings, announcements, etc.) to teachers, teacher associations, schools, and environmental education organizations. Another way to increase accessibility is to work with the Web masters of other regional and headquarters EPA sites, as well as other federal, state, local, and non-governmental environmental sites, to include links to the *Environmental Education Center* on these sites.

EPA Home Page

The accessibility of the *Environmental Education Center* Web site from the EPA home page was assessed based on the results of a user task which asked the teachers to find the *Environmental Education Center* from the EPA home page. Less than half (three of seven teachers) were able to locate the *Environmental Education Center* from the EPA home page. Two of these teachers found the *Environmental Education Center* by clicking on “Audience Groups” in the left side-bar of the EPA home page. The other teacher browsed the EPA home page and clicked on Office of Environmental Education, where she found a link to the *Environmental Education Center*. The teachers who did not find the site tried various approaches, including browsing the home page, searching on the term “clean water,” and browsing the list of EPA topics. One teacher found his way to the EPA *Student Center* but did not see the link to the teachers’ site.

These participants all had the benefit of knowing that there is a special EPA site for teachers, but most still could not find the site. If a user is not aware of the existence of the *Environmental Education Center*, it would be even more difficult to find the site from the EPA home page, since the user might be likely to look for information by topic rather than by target audience.

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"...to protect human health and to safeguard the natural environment..."

In keeping with the President's philosophy of government, EPA is promoting market-based solutions to environmental challenges, focusing on environmental results over bureaucratic process, and building partnerships with the American people. —From Administrator Whitman's Six Month Progress Report

Headlines

Administrator Highlights South Bronx Energy Project
Administrator Whitman visited New York City's South Bronx to promote clean air technology for urban neighborhoods.

Whitman Issues Draft Decision to Dredge Hudson River
EPA is moving forward on a decision to clean up an estimated 1.1 million pounds of polychlorinated biphenyl (PCB) pollution in the Hudson River.

Environmental Progress Report
Administrator Whitman released a report on significant EPA accomplishments protecting health and the environment.

EPA Estimates Costs of Clean Water Program
Implementing one of the key tools to clean up the nation's water could cost between \$900 million and \$4.3 billion. EPA is requesting comments on a draft cost study about the Total Maximum Daily Load (TMDL) program.

Green Diesel Engine Technology Meets EPA Rule for Cleaner Diesel Trucks and Buses
EPA recognized the certification of International Truck and Engine Corporation for its Green Diesel Engine Technology. The company has demonstrated that it is possible to meet federal heavy-duty diesel particulate emission standards well before the 2007 deadline.

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Several changes could be made to the EPA home page to enhance the accessibility of the *Environmental Education Center* from this page. A direct link to the *Environmental Education Center* from the EPA home page, similar to the “Kids” icon that links to the *Explorers’ Club* Web site would be more intuitive than clicking on the “Audience” link. Other ways to improve accessibility to the *Environmental Education Center* would be to work with the Web master of the EPA home page to increase the visibility of the “Audience Groups” label in the left side-bar (e.g., by using a larger font) and add a more visible mouse-over descriptor or drop-down menu to the “Audience Groups” label. It might also be possible to add a link to the *Environmental Education Center* from the “Browse Topics” page, to assist those users who search by topic. A related approach to increasing accessibility to the *Environmental Education Center* would be to improve the visibility of the existing links to the Center that are in the *Student Center* and the *Explorers’ Club* sites.⁴

3.3 Form/Functionality

This section assesses the *Environmental Education Center* based on the seven usability criteria for judging the form and functionality of a Web site and on the results of both the preliminary assessment and user testing.

Navigation and Visibility

A Web site should be constructed so that the user is always informed about where s/he is and where s/he can go within the site. It is important to provide the user with: 1) a clear overview of the site’s content and structure; and 2) easy methods to find whatever information s/he is looking for.

As described above, results of the user tests and expert review suggest that one of the main problems encountered by the teacher participants is that the *Environmental Education Center* is difficult for users to navigate. As one participant put it, “it was tough to find the path to the answers... the difficulty in understanding is due to the layout.” Several ways to improve the site’s structure, navigability, and visibility are described below.

Provide a site overview. A site overview is helpful to those users who prefer to obtain an initial understanding of the site before searching for information, and also serves as a reference if a user is lost or confused. A site overview would be particularly helpful in the *Environmental Education Center* Web site since it is a portal to EPA and other government Web sites and, as such, may be confusing

⁴After the usability testing was performed, EPA removed the “audience” button from its home page and added an “educational resources” button, which includes links to the kids, students and teachers web sites. Additional testing would be required to determine if users can find the *Environmental Education Center* more easily as a result of this revision.

to users who do not understand this structure or realize when they have left the *Environmental Education Center*.

The *Environmental Education Center* contains neither a site overview nor an introductory statement of purpose on the home page. A “Site Overview” or “Getting Started” section should be added as a link on the left side-bar of the site. It should briefly describe the purpose of the *Environmental Education Center*, and provide concise information about who operates the site, the target audience, the general type of information found on the site, and the fact that it is a portal through which users will be linked to other EPA and non-EPA government Web sites. It should also explain that this is one of a trio of environmental education sites maintained by the Office of Environmental Education, each of which is geared towards a different age level/target audience (i.e., kids, students, and teachers).

The *Environmental Education Center* home page does not give a clear indication of the site’s purpose and target audience. A one or two sentence description of the site should be added directly below the title so that users will know that the site provides environmental resources for teachers and other educators.

Provide a site map. A site map or index helps the user understand a site’s content and structure and is particularly helpful to users who do not like to “click through” the pages of a Web site to find information. A site map illustrates the layout of a site, while a site index provides an alphabetical listing of all the topics contained in the site. The *Environmental Education Center*’s “Index” is actually a site map because it lists the main site topics in the general order that they appear in the site.

This section describes several changes that should be made to the structure of the *Environmental Education Center*. After the site is redesigned, a new site map should be developed, which simply and clearly illustrates the site’s structure.

Provide a search engine. The search engine is another useful means for locating desired information. While all of the teacher participants used a search engine during the user test, only two actually used the *Environmental Education Center* search feature. In both cases, the participant was unable to find what s/he was looking for.

The *Environmental Education Center* search engine frequently provides links to general sources of information about the search term rather than to specific Web sites. For example, when a search for the term “recycle” was performed, most of the hits were links to pages within the *Environmental Education Center* that contain Web sites on recycling (e.g., the “Background” and “Curriculum”

sections of the site), rather than to specific recycling sites. Other hits were links back to the *Environmental Education Center* home page or to the site index.

Another problem with the *Environmental Education Center* search engine is that the search results are cluttered and difficult to read: the phrase “US EPA EnvEd Center” is repeated on each line after the name of the site link, and each hit is listed on two lines (the title of the hit is on one line and the URL is on a second line).

In summary, the *Environmental Education Center* search engine would be much more user-friendly if it is revised so that:

- It provides links to specific Web sites rather than to the more general pages within the *Environmental Education Center*,
- It searches each linked site in its entirety, rather than just the site’s title,
- Each hit is listed on one, rather than two, lines (the URL can be placed in parentheses in a small font size directly after the Web site title), and
- The phrase “US EPA EnvEd Center” and any other irrelevant information is deleted from each line of the search results.

In addition, the visibility of the search engine should be improved by adding a search box on the home page so users can type search terms without having to click on the search link.

Provide Links to Home and Other Pages. Another way to enhance navigability and visibility is to provide clearly marked links to the site’s home page and other main pages, so that the user can always find his or her way back to these pages easily and without scrolling. The EPA *Environmental Education Center* provides user access to the home page and other main sections in the site by putting home buttons on the bottom of each page of the site and repeating eight of the main topics on the left side-bar of each page. Nevertheless, much more should be done to ensure the user can easily navigate throughout the site:

- Create “*Environmental Education Center Home*,” “Office of Environmental Education Home,” and “EPA Home” buttons to replace the generic “Home” button that appears at the bottom of each page. Currently, the “Home” button on the bottom of the home page takes the user to the EPA home page, while an identical “Home” button at the bottom of subsequent pages links back to the *Environmental Education Center* home page. This can be confusing to the user, who must figure out what “home” means each time it appears.

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- Revise the bottom links. These should include the following: “Index,” “Search,” “Contact Us,” plus the three home links described above. These are all features that should be easily available to the user without needing to scroll up the page. The current buttons are too prominent - they are more visible than the labels for the main topics. They should be put on smaller buttons or placed in brackets [], or separated by lines “|.” Since the current “Comments” section gives the user the opportunity to both make suggestions and ask questions, the phrase “Contact Us” seems more descriptive.
 - Add a “*Environmental Education Center Home*” button to the top of each page just above the left side-bar. This will enable the user to return to the home page from any page in the *Environmental Education Center* without scrolling to the bottom of the page. Note that while some pages do include a “Back to EPA’s *Environmental Education Center*” statement on the left side-bar, this can result in confusion because it looks like a substantive topic rather than a navigational button.
 - Make the EPA logo a link to the EPA home page and the *Environmental Education Center* banner (at the top of each page) a link to the *Environmental Education Center* home page. This provides the user with an alternative way to return to the EPA and *Environmental Education Center* home pages without creating any extra clutter on the page.
 - Expand the left side-bar on the pages subsequent to the home page to include all of the existing left side-bar headings plus the main eight main topic headings that are on the center globe. This will enable the user to get to almost any page from anywhere in the site and to know exactly where s/he is at all times. Drop-down menus can be used as needed, with the open section highlighted so the user can see where s/he is in the site. This structure will allow the user to be able to get to any page from anywhere in the site and to know exactly where s/he is at all times.

Include a banner heading, main heading, and sub-headings on every page.

Each page of a Web site should identify the site name (e.g., “EPA *Environmental Education Center*”) and any appropriate headings or sub-headings (e.g., “Curriculum Resources & Activities” and “Air”). This enhances both site navigation and site consistency by ensuring that the user will always be informed of exactly where s/he is within the site.

Most of the pages within the *Environmental Education Center* do not contain the name of the site (one exception is the “Index,” where the “US EPA *Environmental Education Center*” banner is below the main heading). This means that the user must always remember that s/he is in the *Environmental Education Center*. In addition, s/he will not know where s/he is if s/he enters the middle of

the *Environmental Education Center* from another web site. Therefore, “EPA *Environmental Education Center*” should be added to the top of each page, just below the EPA logo and above the main heading for the page.

Avoid the Need to Scroll. Many users do not like to scroll up and down the page to find information. The EPA *Environmental Education Center* requires the user to continually scroll from the top to the bottom of the page and back again in order to find his/her way to the home page or to other pages within the site. As described above, one way to avoid the need to scroll is to place all critical content and navigational options on both the top and bottom of the page; placing a *Environmental Education Center* home button on the top of each page will alleviate the need to scroll down in order to return to the home page, and adding *Environmental Education Center*, OEE, and EPA home buttons to the bottom of each page will alleviate the need to scroll back up in order to get home.

Another scrolling issue was illustrated during the user testing. One teacher participant complained about needing to scroll down to find information in the “Curriculum/Water” section of the site. Many of the sections in the *Environmental Education Center* contain so many linked sites that it is necessary to scroll to view them all. As more sites are added, this problem will increase. This problem, combined with the users’ confusion in determining the correct path for finding information, suggests that the structure of the *Environmental Education Center* needs to be revised. The key to developing a successful structure for the *Environmental Education Center* lies in providing a simple but comprehensive alphabetical index of environmental topics and allowing the user to drill down through several understandable layers to find information. Several alternative structures should be considered, including:

- Retain the eight main topics on the home page. On the second-tier pages for the “Background” and “Curriculum” sections, add more sub-topic descriptors to each topic (e.g., add “global climate change” and “global warming” to the “Air” topic). Make both the topic and the sub-topic descriptor links. Clicking on the topic link will bring the user to a tertiary-tier page which will provide a paragraph description of the topic followed by a complete index list of sub-topics for that topic (e.g., “Air” followed by “Acid Rain,” “Climate Change,” “Global Warming,” etc.) Users will click on the appropriate sub-topic link to get to a fourth level page that lists all linked sites related to that sub-topic. For the “Curriculum Resources & Activities” pages, there should be separate sub-headings for “Curriculum” and “Activities,” so the user does not need to scroll down to discover the list of activity sites.
- Replace the “Background Information” and “Curriculum Resources & Activities” topics with a single “Environmental Topics” category. The

second-tier page for this new category will include an alphabetical list of all topics and sub-topics (as described in the preceding bullet). A third-tier page will be made for each topic/sub-topic combination (e.g., Air/Acid Rain). The sub-headings for the third-tier pages will be links to “Background,” “Curriculum,” and “Activities.” The fourth-tier pages will list all linked sites for the selected category (e.g., “Air/Acid Rain/Background”).

- Keep the basic structure but add a separate “Environmental Topics Index,” similar to the EPA home page “Browse Topics,” which allows users to go directly to a very detailed index.

Review for Broken, Incorrect, and Orphaned Links. Web sites should be periodically reviewed for broken, incorrect, slow, and orphaned links. The preliminary assessment and user test revealed several broken and slow links, including: “In The News/EPA Press Releases;” “Environmental Laws/Endangered Species Act; Environmental Laws/What is the Superfund?;” “Curriculum/National Institute of Environmental Health Sciences Kids’ Page;” “Background/Air/Environmental Atlas; Background/Ecosystems/Frog Watch” links to “Estuaries” instead; “Background/Ecosystems/State of the Coast Report (NOAA);” “Background/In Your Neighborhood/Recycling Hotline” (hard to open/download); “Background/Water/Clean Water Act; Curriculum/Conservation/Endangered Species Slide Show” (seems to be wrong link); “Curriculum/Conservation/When Greenville Turned Brown; Curriculum/Ecosystems/Global Change Teacher Guide;” “Curriculum/Human Health/National Institute of Health Kids Page;” “Curriculum/Waste & Recycling/ABC’s of Superfund;” “Curriculum/Water/Safe Drinking Water Act 25th Anniversary;” “Community Service Projects/Give Water a Hand.” In addition, the NOAA “State of the Coast Report” link (“Background/Water”) actually goes to an EPA Office of Wetlands, Oceans and Watersheds site about nonpoint source pollution.

Recognition Rather than Recall

All of the objects, actions, and options on a Web site should be highly visible and broadly understandable so that users can refer to them as guides without needing to remember what they mean. There are a number of ways to construct Web sites to ensure that the user can easily locate and understand the meaning of every site feature. These are described below.

Ensure that all buttons, labels and other options are easily visible and that the purpose of each button and label is clear. Based on results of the preliminary assessment and user tests, several of the buttons, links, and labels used in the *Environmental Education Center* are not completely understandable to the user. For example, the “Students” and “Kids” links on the left side-bar look like

links to pages within the *Environmental Education Center* when, in fact, they take the user off the *Environmental Education Center* Web site to the other EPA environmental education sites. This is a problem for two reasons. First, a Web site should be designed to keep its users on the site for as long as possible before sending them to other, related sites. Second, if a user does want to find a site for kids or students, these two links are not very visible and their purpose is not clear. The links will be more understandable if they are placed on small buttons, star bursts, or other graphics, and moved several lines below the other left side-bar labels. To avoid confusion, it may be helpful to add the appropriate age ranges for each site in a mouse-over label.

A problem highlighted during the user testing is that the contents of the eight major topics on the home page is not always clear. Many of the test participants did not click on the “Background” button when searching for information on global climate change. Other users, looking for information on student internships, did not click on the “Student Jobs and Scholarships” link because they did not think it would also contain internship information. The purpose of these sections (as well as the other main topics on the home page) would be more understandable if some labels are revised (e.g., add “Internships” to “Student Jobs & Scholarships”), and possibly if mouse-over descriptions are provided for each of the eight main topics.

Select text colors, background colors, and font types/sizes that are legible and functional. The teacher participants did not appear to have any trouble reading the text in the *Environmental Education Center*.

Use words, rather than graphics, as labels. The *Environmental Education Center* Web site relies on words, rather than graphics, as labels.

Provide multiple access points to information, but not so many as to clutter the site. As described in the previous section, adding top and bottom home buttons, creating links on the EPA logo and *Environmental Education Center* banner, and including revising the left side-bar will give the user many ways to access the information in the site without adding clutter.

System/Real World Match

Another principle fundamental to a well-designed Web site is that the information presented in the site should be written clearly in language that is familiar to the site’s users. Technical terms and jargon should be avoided, and all terms and metadata in tables should be clearly defined.

The *Environmental Education Center* site is well-written and, for the most part, the page and site descriptions are concise and clear. Technical terms, jargon,

and acronyms are generally not used in the portal site, and there are no statistical tables that require definition of technical terms.

While none of the test participants expressed concern or frustration with the language, it was clear from the task question on global climate change that the teachers are not familiar with all environmental terms. An important way to ensure that users understand the language used in a Web site is to include a dictionary or glossary of terms. The inclusion of the EPA “Terms of the Environment” site and the fact that the user can access the site from both the left side-bar and the “Background/Environmental Basics” section, is an important asset for the *Environmental Education Center*. In fact, one teacher noted during the focus group session that the “dictionary is nice.”

A few minor revisions could further improve the likelihood that site users will notice and use the dictionary. The dictionary would be easier to spot if the left side-bar always contains a link to the Dictionary. Second, it might be helpful to review the *Environmental Education Center* site for environmental terms that might be difficult to understand (e.g., “climate change”) and link them directly to their definitions in the “Terms of the Environment” Web site.

Consistency and Standards

The language, actions, and situations in a Web site should be consistent so that their meanings are clear to the user. One important element of Web site consistency is to adopt consistent design features and interface elements from page to page. Several design and format revisions have been suggested in other sections of this report (see, in particular, “Navigability and Visibility”, and “Recognition and Recall”). Once these changes are made, the entire site should be reviewed to ensure that all features, headings, and titles are consistent across the site. Care should be taken to ensure that all headings, titles, topics, etc. are listed in the same order on each page in the site. For example, the topics currently listed on the left side-bar of the home page (“About EPA,” “Environmental Laws,” etc.) are listed in a different order on the left side-bar of subsequent pages.

The *Environmental Education Center* should be reviewed to ensure that all linked sites have been assigned to the correct categories. For example, the Municipal Solid Waste Factbook is in “Background/Waste & Recycling,” but perhaps should also be in “In Your Neighborhood.” The “Background/Environmental Basics/Tidbits for Teachers” link should also be listed in the “Curriculum/Conservation” section. Also, “In the News” links the user to “2001 Environmental Research Grant Availability Announcements” in the EPA Web site. This link should also be provided in the “Grants” section of the *Environmental Education Center* site. As another example, the “Background” and “Curriculum” sections each contain a link to a Superfund site describing class-

room activities, but these are two different sites. Both should be included in the “Curriculum” section. They may not be appropriate in the “Background” section.

Consistent naming protocols should be used in Web sites so that the user never has to wonder whether different words mean the same thing. No naming protocol inconsistencies were spotted during the expert review or by the test participants.

One of the few “formal” Internet standards that all Web sites generally try to adhere to is the convention of using blue for links to pages that have not been viewed by the user and red or purple for pages that have been seen. The *Environmental Education Center* follows the linking convention most of the time, but a few inconsistencies were found. For example, in the “Search” function, the links quickly turn from blue to purple when they are initially viewed, but then immediately change back to blue. In addition, some of the links are green, rather than blue. In the “Curriculum/Conservation” section, the links to specific sites listed under “Magnificent Ground Water Connection” do not change to purple when they are viewed.

A second “formal” Internet practice that the *Environmental Education Center* site does adhere to is the practice of linking on the name of a Web site, publication, or conference, rather than on a generic description of that item.

The site should also be reviewed for consistency in linkages. For example, in some cases, titles for activities link directly to the activity or game, and in other cases (e.g., “Curriculum/Health” section, “What is Your Annual Radiation Dose” and “Take a Quiz”) they link to a site that contains that activity or game and the user must figure out how to locate the relevant activity.

It would also be helpful to maintain consistency with the EPA *Student Center* whenever possible. For example, users might better understand the connection between the two sites if the left side-bar topics are listed in the same order in both sites, and if linked site titles are consistent (currently one site is referred to as “Water Treatment Path” in the *Environmental Education Center* and “Water Treatment Process” in the *Student Center*). In addition, the sites in the *Environmental Education Center* should be reviewed to see if any of them should also be listed in the *Student Center*, and vice versa. For example, the “Oil Spill Learning Center” currently located in the *Environmental Education Center*’s “Background/Ecosystems” section might also be appropriate for the *Student Center*.

Finally, in order to ensure the on-going consistency of the *Environmental Education Center*, the site should be monitored and updated on a regular basis, and the date of the most recent update should be recorded on the site.

Aesthetic and Minimalist Design

A good web site should have aesthetic appeal and a crisp design that is unhampered by moving images, overwhelming colors, or irrelevant information and features.

Overall, the *Environmental Education Center* Web site has an appealing design and is not cluttered by frames, moving images, or garish colors that distract the user. The teacher participants agreed during the focus group sessions that they found the site to be attractive. They liked the colors (one participant commented that the “colors are good, not tacky”) and thought the graphics are good and clear.

As described earlier, the bottom links are too prominent given their relative importance on the page, and should be made smaller. In addition, when printing the *Environmental Education Center*, the left side-bar does not print out clearly. This problem can be resolved by making new images for each left side-bar label using, for example, a green rectangle with white text.

User Control and Help

A Web site should assist the user in recognizing, diagnosing, and recovering from errors, and should provide succinct help information. One way to provide user control is to provide a means for the user to ask for help. The “Comment” section of the *Environmental Education Center* allows the user to send an e-mail to EPA to ask questions about the agency or the environment or to make suggestions for improving the site. This section could be rewritten to let the user know that s/he can also contact EPA if s/he has questions about how to use the site. As described earlier, changing the name of this section to “Contact Us” would provide a clearer indication that this is the place to go for questions or help of any kind.

Another way to provide user control and freedom is to notify users when they are leaving EPA. The *Environmental Education Center* accomplishes this by locating green “Exit EPA” markers next to each link to an outside site. One of the teacher participants commented that she found these markers to be helpful. The site should be reviewed to ensure that no markers are missing.

Because the EPA *Environmental Education Center* is a portal site, most of the links are to EPA sites outside the Center. This situation can potentially confuse users if they do not realize that they have left the *Environmental Education Center* and then cannot find their way back to the site. While the participants were usually able to return to the *Environmental Education Center* home page by using the “Back” button, one participant did get lost in a linked site and finally used the “Search EPA” function in that site to find his way back to the EPA home page. A “Click Here to Return to the *Environmental Education*

Center” frame, similar to the ones used in the EPA *Student Center* and *Explorers’ Club* sites should be added to the bottom of every page of each linked site to assist users in finding their way back to the *Environmental Education Center*.

Accessibility to Disabled Users

Web sites should be accessible to people with disabilities, including those who are blind, color blind, deaf, or have cognitive disabilities. This report summarizes the findings of a cursory review of the *Environmental Education Center* in order to identify the most obvious ways by which the site can be made more accessible. A more complete assessment should be made by reviewing the EPA Web site on accessibility (see Section 508 Guidelines at <http://Intranet/Accessibility/>). An accessibility software program such as “Bobby” (www.cast.org/bobby) can also be used to identify ways to make the site more accessible to disabled users. A quick review of the *Environmental Education Center* home page using Bobby did not identify any major accessibility problems, but did suggest some minor, technical areas to check.

The most common method of ensuring that a site is accessible to visually impaired users is to provide alternative text markers to describe all images, graphical buttons, image maps, and other non-text features on the site. While most images appear to have alternative text, there are a few instances where it is missing, including, for example, on the main graphic in the Center home page.

Another way of providing accessibility to visually impaired users is to create text-only pages for the site. While there is a “text version” link on the home page of the *Environmental Education Center*, it brings the user to the site index, not a text version of the site. If a text version is desired, it should provide a complete text alternative to all pages of the *Environmental Education Center* and should be updated whenever the site is updated. If it is not desired, the link should be deleted. In either case, alternative text markers should be used.

Certain colors and color combinations are difficult for color-blind users to differentiate. The site uses colors that appear to provide good contrast and it doesn’t combine colors that tend to be hard for color-blind users to distinguish. Any changes made to the colors in the site, should be reviewed for possible problems.

In addition, Web sites should avoid distracting elements by minimizing the use of moving, blinking, scrolling, or auto-updating objects or pages and/or ensuring that these features can be paused or stopped. As described in previous sections of this report, the *Environmental Education Center* does not contain this type of distracting feature.

3.4 Content

A Web site's content can be evaluated according to a number of criteria. This section focuses only on those criteria that reveal the potential for site revisions: the purpose, target audience, coverage, and accuracy of the site.

Purpose and Target Audience

The purpose of a site should be clearly described and located in a highly visible location, and the target audience for the site should be apparent. This information does not appear anywhere on the site. As described in a previous section, an introductory statement should be placed below the EPA *Environmental Education Center* banner, and a Site Overview section should be added that describes the purpose and target audience in more detail.

Coverage

The breadth and depth of the information provided in a Web site should be appropriate to the site's purpose and target audience. The EPA *Environmental Education Center* directs teachers to a great deal of information about EPA and environmental issues. For the most part, the teacher participants found the site to contain a lot of information that is interesting, useful, and appropriate for their students. During the focus group session, one teacher commented, "There is a wealth of information," and another said, "it's a major resource for environmental information." A third teacher said she would use the *Environmental Education Center* as a "cross-curriculum resource."

When asked what type of information they would expect to find in the *Environmental Education Center*, the teacher participants mentioned a variety of environmental topics and types of information. Exhibit 5 lists their responses.

After reviewing the *Environmental Education Center*, the teachers specifically said they liked the sites that provide environmental information on a local level (e.g., "Zip Code Search," and "Surf Your Watershed") and

Exhibit 5 – Information Teachers Expect to Find in the *Environmental Education Center*

Subject Area	Clean Air Endangered Species Environmental Science Energy Nuclear Waste Pollution Rain Forest Preservation Recycling Toxic Waste Disposal Water Conservation
Types of Information	Activities for Students Articles Field Trip Ideas Information Presented by Environmental Topic Lesson Plans Speakers/Presentations from EPA Teacher Resources Worksheets

maps, atlases, and geographical information. They also liked sites that are clearly laid out without overburdening the user with too much detail. One site that the high school teachers particularly liked is “Hazardous Waste: Superfund” (in the “Curriculum/Waste & Recycling” section). As one teacher said, “the lesson plans are set up very nicely. It tells you exactly what you need to do.” In contrast, some teachers commented that the “EPA Environmental Education Grant Program” site provided so much information that it was difficult to comprehend. One teacher suggested the information would be easier to understand if the specific steps required to apply for a grant were laid out simply and in order.

A variety of ways to expand and enhance the content of the *Environmental Education Center* was suggested from the user testing and expert review. These are described below.

Expand existing sections. The *Environmental Education Center* contains more than 70 linked sites - considerably more than either the *Student Center* (44 sites) or the *Explorers’ Club* (21 sites). Even so, there is room to expand and enhance the *Environmental Education Center’s* contents. For example:

- Select sites that are clearly organized and easy to comprehend.
- Add a brief description of each main subject. For example, on the “Background/ Conservation” page, add a paragraph describing what conservation is and the types of sites included in this section. This is particularly important for the “Ecosystem” page. Also, it may be useful to add some sites that describe what an ecosystem is and give examples of different ones.
- Add more bilingual sites to the *Environmental Education Center*. The teacher participants from Sandoval Elementary, which has a large Hispanic population, appreciated the few bilingual sites that already exist, and indicated that they would like to see more.
- Add a new “Resources” section or sub-section. This could include sites with information on environmental videos, speakers, books, tapes, and field trip ideas. (Some or all of the Office of Environmental Education Web site’s “Resources” section could be included.)
- Add more sites to the “About EPA” section. Teachers may find links to EPA organizational charts, EPA office descriptions, and possibly even the EPA locator to be useful.
- Expand the “Background/Environmental Basics” section. This page provides an opportunity for the user to get a good overview of all the different environmental issues and how they relate to each other. How-

ever, the site log indicates that this is one of the least visited pages in the *Environmental Education Center*. One reason for this may be that users may not understand what type of information is contained in this section. Another reason is that the section provides only a few basic information sites. More sites are needed, including, perhaps, a concise overview of environmental issues and an Environmental Footprint Tool that shows teachers and their students the overall environmental impact of their daily activities and provides links to information on how to reduce these impacts.

- Consider expanding the “Awards” section to “Awards and Contests.” Teachers are often interested in finding competitions that their students can participate in (e.g., EPA Region 1 has an environmental art contest - “Curriculum/Air/Project AIRE/Earth Artists Program”) and this would be an appropriate place to include this type of information. In fact, the “Envirothon” program described in the “Awards” section seems to be more of a contest than an award program.
- Expand the “Student Jobs & Scholarships section.” This is one of the most frequently visited sections in the *Environmental Education Center* Web site. While this indicates that teachers are looking for information on environmental internships and jobs for their students, the site does not appear to have very much information that would be helpful to middle school and high school students, other than descriptions of possible environmental careers. Add the term “Internships” to the section title.
- Add a section or subsection (possibly to the “Curriculum Resources & Activities” page) with links to sites that provide good ideas for science fair projects and other hands-on science activities. This would involve linking to: 1) the science fair ideas portions of the sites that are already part of the *Environmental Education Center*; and 2) new sites that can be added to the Center.
- Review the EPA Office of Environmental Education Web site to ensure that the *Environmental Education Center* links to all relevant information in this site (including, for example, the “Environmental Education & Training Partnership” and “Regional Environmental Programs” pages).
- If EPA hasn’t already done so, review all EPA headquarters and regional Web sites to identify pages that could be linked to the *Environmental Education Center*, and work with the appropriate offices to improve those selected for inclusion, as necessary. For example, Region 7 has a “Teachers’ Lounge” page which might be appropriate for inclusion in the *Environmental Education Center*.

Review descriptions of linked sites. The descriptions of each linked site should be reviewed to ensure they are complete, consistent, and mention information that is of particular importance to teachers. For example:

- Identify the types of information that teachers are most likely to be looking for (e.g., appropriate age or grade, whether a site is in Spanish, whether it contains curricula, lesson plans, planning guides, science fair ideas, etc.) and add these key words to the descriptions of individual Web sites. For example, the “Globe Program” Web site (which is listed in the “Background” and “Curriculum” sections) contains a detailed teachers guide which should be noted in the description of the site. Similarly, in the “Background/Conservation” section, the description for the “Year of the Ocean Kids Page” should say the site contains an “Educator’s Guide” and links to interesting web sites. Some of the teacher test participants wanted to see the appropriate grade or age level for each site, while others felt that this was not necessary. One teacher suggested that key indicators be put in boldface font, so users don’t need to read through a lot of text.
- Add a description of each linked site in the “Activities” subsection of the “Curriculum Resources & Activities” pages.
- When looking for EPA publications, the teacher participants were dismayed to find that the NCEPI site only provides references to publications, instead of direct links. The description of this site should mention this fact, so users who are only interested in direct access to a publication will not spend time navigating the site.
- In “Curriculum/Conservation/Magnificent Ground Water Connection,” five specific curricula are listed, with separate links to each curriculum. However, the site contains numerous other interesting curricula that are not listed in the *Environmental Education Center* site.

Delete or revise the “Contacts & Other Links” section. The section title, “Contacts & Other Links,” does not convey the type of substantive information contained on this page. Thus, it is unlikely a teacher would visit this section, but when s/he does, it would be difficult to find a specific topic because of the catch-all nature of the section. The following revisions could be made:

- Move the informational linked sites to appropriate sections in the “Background,” “Curriculum,” or another main pages. If some of the sites do not seem to fit any of the existing sections, a new section could be added to accommodate them. (Perhaps an “Other” or “General Sciences” subsection in the “Background” and/or “Curriculum” sections would be useful).

-
- Either delete the “Contacts & Other Links” section entirely or reserve it for actual contact information (i.e., links to agencies, offices, or people who the user might want to call or e-mail for additional information). It might also be possible to revise this section by clearly marking it as containing links to other *environmental education centers* (e.g., the EPA Office of Environmental Education site and other federal/state/regional environmental education sites) that teachers might want to peruse after using the EPA *Environmental Education Center*.

Accuracy

A Web site should provide information that is accurate and free of both substantive and grammatical/spelling errors. The portal portion of the *Environmental Education Center* appears to provide information that is substantively accurate and appropriate for its users. The accuracy of the sites outside the portal site is tracked by the Access Workgroup, which follows an established system for evaluating potential sites. The *Environmental Education Center* should also be reviewed periodically for misspellings, grammatical errors, and format issues.

The preliminary assessment revealed some minor mistakes. For example:

- In the “Background/Conservation” section, the “National Marine Fisheries Service Office of Protected Resources” site reads “Protect Resources.”
- The “Recycling Publications” link is titled “Recycling” and is therefore a little misleading for the user. The description of the site should clarify that the site contains numerous publications about recycling.
- In the “Background/Ecosystems/American Forests” description, “focusing” is misspelled.
- In “Grants/Tools and Resources for Livable Communities, “comprehensive” is misspelled.
- A word is missing in descriptions to “Curriculum/Ecosystems/Global Change Teacher Guide.”
- In “Curriculum/Activities/Air,” the link to the National Park Service site should be moved to after the sentence, “Here are a few activities from elsewhere on the Web.”

3.5 Summary

Exhibit 6 combines all the usability criteria and scores the key indicators of each criterion according to whether it is of “No/Limited Concern,” “Moderate Concern,” or “Major Concern.”

Exhibit 6 – Evaluation: Usability Do’s and Don’ts

Usability Criteria/Do’s and Don’ts	No/Limited Concern	Moderate Concern	Major Concern
Site Accessibility			
Do: Link Site to Many Key Words and Phrases	✓		
List Site with Other Educational Web Sites			✓
Register with Commercial Site Engines			✓
Create Visible Links from Other Sites			✓
Publicize Site			✓
Make Site Accessible from EPA Home Page			✓
Form and Functionality			
Navigability			
Do: Provide a Site Overview			✓
Provide a Site Map			✓
Provide a Search Engine			✓
Identify and Link Back to Home			✓
Provide Headings on Every Page			✓
Check for Broken, Incorrect, and Orphan Links		✓	
Don’t: Make People Scroll			✓
Recognition Rather Than Recall			
Do: Make Options Visible		✓	
Use Clear, Legible Color Combinations and Font Sizes	✓		
Make Each Button’s Purpose Clear		✓	
Use Pop-Up Descriptions/Mouse-Overs Where Appropriate		✓	
Provide Multiple Access Points to Information			✓
Don’t: Use Graphics as Labels	✓		
System/Real World Match			
Do: Define Technical Terms		✓	
Provide a Glossary of Terms	✓		
Define Terms/Metadata in Tables	✓		
Don’t: Use Technical Jargon	✓		
Consistency and Standards			
Do: Adopt Consistent Design Features/Interface Elements	✓		
Use Consistent Terminology, Labels, and Linkages		✓	
Classify Information Consistently and Correctly		✓	
Use Consistent Naming Protocols	✓		
Use Standard Colors for Links		✓	
Use Publication Titles for Links	✓		
Don’t: Forget to Update		✓	

Exhibit 6 – Evaluation: Usability Do’s and Don’ts (continued)

Usability Criteria/Do’s and Don’ts	No/Limited Concern	Moderate Concern	Major Concern
Aesthetic and Minimalist Design			
Do: Provide Age-Appropriate Design	✓		
Ensure Pages Print Out Legibly		✓	
Don’t: Clutter Page with Too Many Links	✓		
Use Frames	✓		
Use Moving Images	✓		
Include Irrelevant Information	✓		
Use Overwhelming Colors	✓		
User Control and Help			
Do: Provide Contact Information		✓	
Use Exit Markers at Links That Go Off-Site	✓		
Provide a Means for Users to Return to Site		✓	
Accessibility to Disabled Users			
Do: Provide Alternative Text Markers		✓	
Update Text Pages			✓
Use Color Combinations That Color-Blind Users Can Detect	✓		
Review Site for Accessibility		✓	
Don’t: Use Color Coding	✓		
Use Distracting Elements	✓		
Content			
Do: Describe the Site's Purpose and Target Audience		✓	
Provide Appropriate Breadth and Depth of Information		✓	
Provide Accurate Information	✓		
Review for Grammar and Spelling Errors		✓	
All Criteria	20	17	13

4.0 ANALYSIS OF LINKED SITES

While the main objective of the usability analysis is to review the portal portions of the *Environmental Education Center* and develop recommendations for improving these sections of the site, it is also important to assess the linked sites. It was impossible to conduct an analysis of all 72 sites that can be accessed through the *Environmental Education Center*. Nevertheless, the teacher participants did comment on ten sites that they had the opportunity to visit during the user testing sessions. Their comments are summarized in Exhibit 7.

As shown in the exhibit, the teachers had favorable impressions of most of the sites. In fact, their comments on five of the sites were entirely positive (“EELink,” “Hazardous Waste,” “Sunwise,” “Surf Your Watershed,” and “Water Treatment Path”). The teachers also liked the “Chesapeake Bay Game” and the EPA “Environmental Education Grant Program” sites, but expressed some concerns about the usability and understandability of these sites. In addition, the participants were unhappy that they could not print documents from the “National Center for Environmental Publications and Information” Web site, and thought that the “Pollution Prevention Toolbox” site should be reorganized. Finally, they were unable to visit the “Service Learning” site because they could not download PDF files.

It is clear that the success of the *Environmental Education Center* depends on both the usability and content of the linked sites. The teachers’ comments about the sites they visited suggests the need exists to perform usability assessments on some of the existing linked sites as well as any sites that are being considered for inclusion in the *Environmental Education Center*.

Exhibit 7 – Environmental Education Center Linked Sites: Test Participants’ Comments

Linked Site Name	EPA Office/ Other Agency	Site Location	Number of Participants Who Commented	Comments
Chesapeake Bay Game*	NASA	Curriculum/ Water	1	<ul style="list-style-type: none"> Liked the game but wondered where all the puzzle pieces were/confused as to how to play it.
EELink - Environmental Education Grants Resources	North American Association for Environmental Education (NAAEE)	Grants	1	<ul style="list-style-type: none"> Appreciated link to grants for K-12 Liked graphics. Liked organization.
EPA Environmental Education Grant Program*	Office of Environmental Education	Grants	4	<ul style="list-style-type: none"> Liked grant writing tutorial. Thought "Next" button on grant writing tutorial was hard to find and navigation difficult. Liked OEE Guidelines and Assessments, especially tips and goals. Liked being able to type directly onto grant form. Too much to read on the site. Site is confusing. Description of how to apply is difficult to comprehend. The rest is okay. Some participants didn't have Adobe Acrobat so couldn't download application.
Hazardous Waste: Superfund	OSWER/ Superfund	Curriculum/ Waste & Recycling	2	<ul style="list-style-type: none"> Site seems age appropriate Lesson plans are nicely set up It tells you exactly what you need to do and is very informative Liked the activity she sound. Site is straight forward. Site is full of material that would be applicable in a senior high class.
National Center for Environmental Publications & Information*	National Center for Environmental Publications & Information	Publications	5	<ul style="list-style-type: none"> Frustrated that publications aren't available on-line. Unclear whether can print out publications. On-line advertisements (including one for casinos) popped up. Impressed by foreign language option.
Pollution Prevention Toolbox*	EPA Region 5	Curriculum - Various Sub-Topics	1	<ul style="list-style-type: none"> Too much text. Needs more graphics. Would be better in outline format.
Service-Learning: Education Beyond the Classroom*	OSWER/OSW	Community Service Projects	2	<ul style="list-style-type: none"> Couldn't download because don't have Adobe Acrobat Reader.
Sunwise School Program	Office of Air and Radiation	Background/ Human Health	1	<ul style="list-style-type: none"> Good concept. It is important to teach kids about ultraviolet radiation and its effect on the skin.
Surf Your Watershed	Office of Water	Curriculum and Background - Various Sub-Topics	1	<ul style="list-style-type: none"> Liked opportunity to get local information. Liked atlas function for geography infusion.
Water Treatment Path	Office of Water	Curriculum/ Water	1	<ul style="list-style-type: none"> Liked the site a lot. Liked graphics. They are clear. Liked mouse-over feature and word scramble approach. Would be helpful when teaching where water comes from and in science. Good learning level for 7th grade students.

*Sites where teachers' comments indicate possible need for further usability assessment.

5.0 RECOMMENDATIONS

The recommendations described in the previous section for improving the usability of the EPA *Environmental Education Center* are summarized below.

5.1 Increase Site Accessibility

- a. Register the *Explorers' Club* with as many commercial search engines as possible.
- b. Consider contacting educational resource Web sites to investigate the possibility of providing links to the *Environmental Education Center* from these sites.
- c. Market the *Environmental Education Center* to teachers, teacher associations, schools, and environmental education organizations.
- d. Work with Web masters of other regional and headquarters EPA sites, as well as other federal, state, local, and non-governmental environmental sites, to include links to the *Environmental Education Center* on their sites.
- e. Increase the visibility of the *Environmental Education Center* from the EPA home page.
- f. Increase the visibility and clarify the purpose of the *Environmental Education Center* links that are in the EPA *Explorers' Club* and *Student Center* Web sites.

5.2 Revise Site Structure (See Exhibit 8)

- a. Revisions to Home Page Only
 - i. Add a short description of the *Environmental Education Center* under the title.
 - ii. Add a search engine box so users can type in a search term without having to click on the search engine link.
 - iii. Consider adding mouse-over descriptions for each of the eight major topics.
- b. Revisions to Second-Tier and Subsequent Pages Only

Exhibit 8 – Environmental Education Center Sample Fourth Level Page Layout



Banner: ENVIRONMENTAL EDUCATION CENTER

Heading/Sub-Heading: Curriculum Resources & Activities > Air > Acid Rain

Organizational Links: [Curriculum Resources](#) [Activities](#)

Left Side-Bar:



Index
Search

Site Overview
About EPA
Dictionary
Environmental Laws
In the News
Publications

Background Information

- Air
- Conservation
- Ecosystems
- Environmental Basics
- Human Health
- In Your Neighborhood
- Waste & Recycling
- Water

Note: This page shows all drop-down menus for each heading. The topic(s) that is (are) open will be highlighted. When using the site, the menu for the page that is open will be visible. There will be a small arrow next to each heading for which a drop-down menu exists, to indicate that a menu is available.

Curriculum Resources & Activities

- Air
- Conservation
- Ecosystems
- Human Health
- Waste & Recycling
- Water

Community Service Projects
Workshops & Conferences
Student Jobs & Scholarships
Awards
Grants
Contacts & Other Links

[Index] [Search] [Contact Us]

[Env. Ed. Center Home][Office of Env. Ed. Home] [EPA Home]



-
- i. Expand the left side-bar to include all the existing left side-bar headings plus the eight main topics headings that are around the center picture on the home page. Use drop-down menus to show sub-topics for each main heading.
 - ii. Revise the left side-bar so that the topic and sub-topic that are being viewed are highlighted.
- c. Revisions to All Pages
- i. Revise the left side-bar so that the links to the EPA *Student Center* and *Explorers' Club* sites are moved to buttons or star bursts below the side-bar. Consider adding a mouse-over description of the age ranges for each site.
 - ii. Place a consistent banner title (“EPA *Environmental Education Center*”), main heading, and sub-headings on each page.
 - iii. Create “*Environmental Education Center Home*,” “Office of Environmental Education Home,” and “EPA Home” buttons at the bottom of every page to replace the generic “Home” button.
 - iv. Revise the bottom links to include: “Index,” “Search,” “Contact Us,” and the three home links described above.
 - v. Reduce the size of the bottom links and separate them with brackets [] or lines.
 - vi. Add an “*Environmental Education Center Home*” button to the top of each page just above the left side-bar.
 - vii. Make the EPA logo that appears on every page a link to the EPA home page.
 - viii. Make the *Environmental Education Center* banner that appears on every page a link to the *Environmental Education Center* home page.
- d. Revise the Overall Structure to include a comprehensive alphabetical index of environmental topics that allows the user to drill down through several layers to find information. Possible alternative structures to consider include:
- i. Retain the eight main topics on the home page. On the second-tier pages for the “Background” and “Curriculum” sections, add more sub-topic descriptors to each topic (e.g., add “global climate change” and “global warming” to the “Air” topic). Make both the topic and the sub-topic

descriptor links. Clicking on the topic link will bring the user to a tertiary-tier page which will provide a paragraph description of the topic followed by a complete index list of sub-topics for that topic (e.g., “Air” followed by “Acid Rain,” “Climate Change,” “Global Warming,” etc.) Users will click on the appropriate sub-topic link to get to a fourth level page that lists all linked sites related to that sub-topic. For the “Curriculum Resources & Activities” pages, there should be separate sub-headings for “Curriculum” and “Activities,” so the user does not need to scroll down to discover the list of activity sites. (See Exhibit 8.)

- ii. Replace the “Background Information” and “Curriculum Resources & Activities” topics with a single “Environmental Topics” category. The second-tier page for this new category will include an alphabetical list of all topics and sub-topics (as described in the preceding bullet). A third-tier page will be made for each topic/sub-topic combination (e.g., Air/Acid Rain). The sub-headings for the third-tier pages will be links to “Background,” “Curriculum,” and “Activities.” The fourth-tier pages will list all linked sites for the selected category (e.g., “Air/Acid Rain/Background”).
- iii. Keep the basic structure but add a separate “Environmental Topics Index,” similar to the EPA home page “Browse Topics,” which allows users to go directly to a very detailed index.

5.3 Improve Site Navigability

- a. Add a site overview that describes:
 - i. The *Environmental Education Center*’s purpose, target audience, authorizing agency, type of information, and how to find information.
 - ii. That it is a portal to other EPA and governmental sites and that companion sites for kids and students exist.
- b. Revise the site map after all changes to the site structure have been made.
- c. Improve the search engine to:
 - i. Provide links to specific Web sites rather than to the more general pages within the *Environmental Education Center*;
 - ii. Search an entire site for the search term, rather than just the site’s title.
 - iii. List each hit on one, rather than two, lines (the URL can be placed in parentheses in a small font size directly after the web site title).

-
- iv. Delete the phrase “US EPA *Environmental Education Center* ”and any other irrelevant information from each line of the search results.
 - v. Add a search engine function to the home page so the user can immediately type in a search term without clicking on the link to the search engine.
- d. Review the site on a regular basis for broken, bad, slow, and orphaned links (software programs are available for this purpose.)

5.4 Clarify Terminology

- a. Provide a definition of environmental terms when they are used in the introduction to a section or in the description of a link.
- b. Consider linking technical terms that are used in the site to their definition in the glossary.

5.5 Improve Site Consistency and Standards

- a. After all revisions are made, review the entire site to ensure that all features, headings, titles, and design elements are consistent across the site,
- b. Review the site to be sure that all linked sites have been assigned to all appropriate topic categories.
- c. Review the site to ensure it adheres to the Internet convention of using blue for links that have not been viewed and red or purple for links that have been seen.
- d. Review the site for consistency in linkages (e.g., in some cases a link takes the user directly to an activity and other times a link goes to a Web site that contains the activity and the user must then find it on his own).
- e. Maintain consistency with the EPA *Student Center* whenever possible.
- f. Monitor and update the site on a regular basis, and whenever new sites are added or other revisions are made. Be sure to record the date of the most recent update.

5.6 Enhance Site Design - make new images for the left side-bar labels so that they will print out clearly.

5.7 Enhance User Control and Help

- a. Change name of “Comment” section to “Contact Us” and add the opportunity for the user to ask questions about how to use the site.
- b. Review the site to ensure that no “Exit EPA” markers are missing.
- c. Add “Click Here to Return to the *Environmental Education Center*” frames to every page of each linked site to assist users in finding their way back to the *Environmental Education Center*.

5.8 Assess Accessibility to Disabled Users

- a. Review the site to ensure it is in accordance with EPA’s guidelines for accessibility (see Section 508 Guidelines at <http://Intranet/Accessibility/>).
- b. Review the site using an accessibility software program, such as Bobby (www.cast.org/bobby), to identify ways to make the *Environmental Education Center* more accessible to disabled users.
- c. Review the site to identify any missing alternative text markers for images, graphical buttons, image maps, and other non-text features.
- d. Update the text version of the *Environmental Education Center* so that it provides a text version of the entire site. Alternatively, rely on the text markers for this purpose and delete all “text version” links from the *Environmental Education Center*.

5.9 Evaluate Technical Problems

- a. Test the *Environmental Education Center* on older, slower computers to determine if the difficulty experienced by high school teachers in downloading the left side-bar will recur on other computers.
- b. Investigate why on-line advertisements appeared while test participants were looking at both EPA and outside EPA Web sites.

5.10 Add Content

- a. Expand existing sections of the *Environmental Education Center*.

-
- i. Select sites that are clearly organized, easy to comprehend, and do not provide too much detail.
 - ii. Add a short paragraph description of each main subject/sub-topic (e.g., to the “Background/Conservation page).
 - iii. Add more bilingual sites.
 - iv. Add a “Resources” section that contains sites with information on videos, speakers, books, tapes, computer games, field trip ideas, etc. that teachers can use in the classroom.
 - v. Expand the “About EPA” section.
 - vi. Expand the “Background/Environmental Basics” section.
 - vii. Add information on contests to the “Awards” section.
 - viii. Expand the “Student Jobs & Scholarships” section to include more information on environmental internships and jobs for middle- and high school students. Add the term “Internships” to the title of this section.
 - ix. Add links to sites that provide ideas for science fair projects and hands-on environmental science activities. Be sure to link directly to the science fair sections of sites that are already part of the *Environmental Education Center*.
 - x. Review all EPA headquarters and regional Web sites to identify pages that could be linked to the *Environmental Education Center*, including the Office of Environmental Education Web site (e.g., “Environmental Education & Training Partnership” and “Regional Environmental Programs”) and the Region 7 “Teachers Lounge.”
- b. Review descriptions of linked sites
 - i. Identify the types of information that teachers are most likely to be looking for (e.g., type of site, age/grade, bilingual) and add key descriptors to the linked sites descriptions.
 - ii. Add a description of each linked site listed in the “Activities” subsections of the “Curriculum Resources & Activities” sections.
 - c. Delete or Revise the “Contacts & Other Links” section.
 - i. Move the informational sites that are specific to a particular topic to appropriate locations in the “Background” or “Curriculum Resources & Activities” pages and/or create new sections for these sites.

-
- ii. Reserve the “Contacts & Other Links” for links “contacts” (e.g., links to agencies, people, or offices who the user may want to e-mail for information) and “other links” (e.g., other large environmental education Web sites similar to the *Environmental Education Center*.)

5.11 Review for Accuracy

- a. Periodically review the *Environmental Education Center* site for grammar and spelling errors.
- b. Continue the existing system for evaluating sites before adding them to the *Environmental Education Center*, to ensure accurate and appropriate content.

5.12 Perform Additional Usability Testing

- a. Develop one or two prototypes that incorporate the recommended changes, including a revised site structure for the *Environmental Education Center*, and test these prototypes on middle school and high school teachers before finalizing the site revisions
- b. User testing should include a task asking participants to locate the *Environmental Education Center* from the revised EPA home page.
- c. Work with program and regional EPA offices to perform expert review and user testing on EPA Web sites that are potential candidates for inclusion in the *Environmental Education Center*. The results can be assessed in relationship to the Access Workgroup’s Web site evaluation.

APPENDIX 1
EPA *ENVIRONMENTAL EDUCATION CENTER*
USER TEST FORMS

May 8, 2001

Date _____ Time _____ Participant Name _____

EPA TEACHER CENTER Web site Usability Test
Participant *Entry* Questionnaire

5.1 *What grade do you teach?*

_____ (please specify)

5.2 *Please describe your level of experience using World Wide Web:*

___ beginner ___ intermediate ___ advanced

5.3 *On average, how often do you use the World Wide Web (not including e-mail)?*

___ less than once a week ___ once a day
___ less than once a day ___ more than once a day

5.4 *How would you describe the connection speed you typically have to the Web?*

___ slow ___ fast ___ what kind of connection do you have?

5.5 *Have you ever used the EPA Teacher Center Web site?*

___ yes ___ no

6. *What would you look for on a site called EPA Teacher Center?*

Date _____ Time _____ Participant Name _____ (optional)

**EPA TEACHER CENTER Web Site Usability Test
Participant **Post-test** Questionnaire**

1. *Were the task questions you completed the type of information you would come to the EPA TEACHER CENTER Web site to look for?*

_____ Yes _____ No

2. *Did you use the search button?*

_____ Yes _____ No

3. *Why would you to return to the EPA TEACHER CENTER Web site?*

_____ Nothing at all, would not return

4. *When I was performing a task I:*

_____ Felt Lost _____ Felt I knew where I was

5. *After performing the test how easy or difficult do you think it would be for you to find information that interest you on the EPA TEACHER CENTER Web site?*

_____ Easy to Find _____ Difficult to Find

6. *The Home-Page was structured in a way that made it easy to find information:*

_____ All of the time _____ Most of the Time _____ Some of the Time _____ Never

7. *Did the information flow logically on the Web site*

_____ All of the time _____ Most of the Time _____ Some of the Time _____ Never

8. *I would like the EPA TEACHER CENTER Web site to have: _____*

OBSERVER NOTES

Web Site: EPA Environmental Education Center

High School Teachers

Date: June 6, 2001

Observer Name: _____

Observer Phone Number: _____

Observer E-mail _____

Participants Name: _____

Browser Used : Netscape or Explorer

It is absolutely necessary that you do not offer any comments or assistance unless necessary.

If you are having a problem or your participant is having a problem please flag down the moderator.

Focus Group Question 1.

If you were looking for information to help plan an environmental curriculum for your students, how would you begin your Internet search?

www.epa.gov/teachers/

--What search engines do you like to use?

--What search terms would you use?

Search Engine : _____

Verbal Comments:

Task 1.

Please go to the EPA home page at www.epa.gov. Search for environmental information that is at an appropriate level for your students.

Path/Destination URL/Answer:

<http://www.epa.gov/teachers/>

Note to observers: If the teacher has any problems finding the Environmental Education site, ask if s/he can suggest ways that EPA might make it easier to locate from the EPA home page.

Please check off the following behaviors of the participant & note other behaviors, which may not be included in this list.

User Comments/Attitude

Annoyed Frustrated Confusion Effortless

"BACK" Button use "STOP" Button use Search Too use False Start

Graphics (comments made):

Disappointment (comments made):

Technical Difficulties

Broken Link Long-wait for pages to load

Page did not load Other Web Site Errors : _____

Task competed _____ Yes _____ No

TASK 2

Find information about how your school can apply for a grant to fund an idea you have for an environmental education project.

Path/Destination URL/Answer:

www.epa.gov/enviroed/solnotice01.html

“Grants”

click on “EPA Environmental Education Grant Program”

click on “Solicitation Notice, Fiscal Year 2001”

Answer: this entire section describes grant program

TASK 3

Look for information about environmental jobs and internships available for your high school students.

Path/Destination URL/Answer

<http://interactive.usgs.gov/Student/Benefit/seep.asp>

“Student Jobs & Scholarships”

Click on “USGS Jobs”

Click on “Apply for Student Jobs”

Click on “Vacancies”

Click on “All Categories”

Answer: USGS offers a job program for high school students (Student Temporary Employment Programs). Maybe the teachers will find more.

Note to observers - ask teacher:

--Are the Web sites found in the “Student Jobs and Scholarships” section helpful to you in assisting your students in finding student jobs and internships in the environmental field?

--Why or why not?

TASK 4

Please find a specific high school-level classroom activity that you could use for a unit on hazardous waste.

Path/Destination URL/Answer:

www.epa.gov/superfund/students/clas_act/haz-ed/hazindex.htm#activity
“Curriculum Resources”
Click on “Waste & Recycling”
Click on Hazardous Waste: Superfund
Click on Activities
Select an activity

Note to observer- ask teacher:

–Did you find an activity that would be appropriate for high school students?

–What did you like or dislike about this site?

TASK 5

You have decided to prepare a lesson plan for your class on global climate change and how it affects the environment. Can you find two sources to help with your curriculum development?

Path/Destination URL/Answer:

www.epa.gov/region01/students/teacher/aire.html
“Curriculum”
Click on “Air”
Click on “Project AIRE”
Click on “Project AIRE”

AND

www.epa.gov/globalwarming/
“Background”
Click on “Air”
Click on “Global Warming”

TASK 6

Find a site where you can search for EPA publications on a variety of environmental topics

Path/Destination URL/Answer:

www.epa.gov/ncepihom/catalog.html

“Publications” (on left side-bar)

Click on “National Center for Environmental Publications & Information”

Click on “Search the Catalog”

TASK 7

Find an idea for a community service project that you and your students could implement to encourage recycling in your area.

Path/Destination URL/Answer:

www.epa.gov/epaoswer/general/educate/svclearn.htm

“Community Service Projects”

Click on “Service-Learning: Education Beyond the Classroom”

Download pdf file

--Did you locate any interesting recycling community service projects?

--Why or why not?

TASK 8

What are the three types of ionizing radiation?

Path/Destination URL/Answer:

www.epa.gov/radiation/students/types.html

“Background”

Click on “Human Health”

Click on “Radiation Protection Students/Teachers Page”

Click on “Types of Radiation”

Answer: Alpha, Beta, and Gamma

FOCUS GROUP QUESTIONS

Now that you've had a chance to look at more of the EPA Teacher Center site, we'd like to know what you think about the site.

–Would you come back to the Teacher Center on your own?

–Why or why not?

For example:

–Is the Student Center easy to use?

–Did you understand how to find the information you were asked to look for?

--Did you usually feel as if you knew where you were in the site or did you feel lost a lot of the time?

–Do you have a good understanding of the type of information you can find on the site?

--Does the Student Center contain interesting and/or useful information?

--Do you like the design and the colors that are used?

–Do you like the graphics?

--Are the descriptions of each site that you can go to within the Student Center clear and complete?

–Do they give you a good idea of what each site will contain?

--Would you make any changes to improve the Web site

OBSERVER NOTES FOR MIDDLE SCHOOL TEACHERS

The Observer Notes for middle school teachers were similar to the preceding set of questions for high school students, with some changes to the specific tasks. The following task questions were used:

Task 1: Please go to the EPA home page at www.epa.gov. Search for environmental information that is at an appropriate level for your students.

Task 2: Find a site where you can search for EPA publications on a variety of environmental topics.

Task 3: Find information about how your school can apply for a grant to fund an idea you have for an environmental education project.

Task 4: Please find a specific elementary grade-level classroom activity that you could use for a unit on water quality.

Task 5: You have decided to prepare a lesson plan for your 8th grade class on global climate change and how it affects the environment. Can you find two sources to help with your curriculum development?

APPENDIX 2

**EPA *ENVIRONMENTAL EDUCATION CENTER*
USER TEST RESULTS**

Summary of Focus Group and User Test Results
EPA Environmental Education Center Web Site
Sandoval Elementary School, Chicago Illinois

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Pre-Test Questions					
Grade	8th	7th	8 th (Science)	4th	Computer Lab
WWW Experience	Intermediate	Advanced	Intermediate	Intermediate	Intermediate
Freq. Of Use	Once/day	>once/day	>once/day	once/day	>once/day
Connect Speed	NR	Fast	Fast (ISDN)	Medium (ENC, Argonne Natl. Lab, AOL)	Fast
Used Teacher Center Site?	Yes	Yes	No (have seen it but not used it.)	No	No
What would you expect to find on site?	NR	<ul style="list-style-type: none"> • How to recycle. • How to get students involved with recycling. • Teacher lesson plans. 	<ul style="list-style-type: none"> • Proper disposal procedures for common toxic waste. • Study activities for students, listed by subject matter. • Speakers and presentations available from EPA. • Information by environmental topic. 	<ul style="list-style-type: none"> • Recycling projects (paper, cans, glass) • Clean air • Pollution 	<ul style="list-style-type: none"> • Lesson plan to use in class room.
Post-Test Questions					
Were the task questions type of info you'd look for?		Yes	Yes	Yes	Yes
Use Search Tool?		Yes	Yes	No	Yes

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
What info would bring you back to site?		<ul style="list-style-type: none"> • Air • Water • Land • Pollution prevention • Lesson plans 	<ul style="list-style-type: none"> • Grants • Research 	<ul style="list-style-type: none"> • More specifics on grade/age levels 	<ul style="list-style-type: none"> • Resources for teacher and classroom activities
How did you feel when perform-ing a task?		I knew where I was	I knew where I was	I knew where I was	I knew where I was
Would it be easy or difficult to find info that interests you on the site?		Easy	Easy	Easy	Easy
It was easy to find info on home page:		All the time	Most of the time	All the time	Most of the time
Info flowed logically:		All the time	Most of the time	All the time	Most of the time
I'd like the site to:		NR	NR	<ul style="list-style-type: none"> • Specific age/grade level • More on worms! 	NR
Focus Group Questions					
Browser	Explorer	Netscape	Netscape	Netscape	Netscape
1. How begin search/favorite search engines and search terms?	<ul style="list-style-type: none"> • Google • Yahooigans • When looking for EPA home page, tried epa.com, www.epa.com, and then Google search on "environment" 	<ul style="list-style-type: none"> • Netscape • Yahooigans for children • Yahoo • AOL • Google • CNN • Monster Power • Uses search terms by subject matter (e.g., physics, ecosystem, aquifer, pollution, garbage, recycling) 	<ul style="list-style-type: none"> • Google • Monster Crawler • CNN • Search by subject matter (e.g., physics, ecosystem, aquifer, pollution, garbage, recycling) 	<ul style="list-style-type: none"> • Google • Monster Crawler • Yahoo • CNN 	Teacher not here for this question..

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
2. How find site from EPA home page?	<ul style="list-style-type: none"> • Hard to find the site from the EPA home page. • Wasn't instinctive to look under audience groups. 	<ul style="list-style-type: none"> • Found site through the Audience link on EPA home page. • Went directly to Curriculum Resources and Community Resources link. 			<ul style="list-style-type: none"> • Looked for link to teachers site, but could only find kids site link. Scrolled around but couldn't find teachers site • Didn't know to click. • "Need to expand our audience group"?? • Searched on EPA, environment, recycling, to find the site.
3. Impressions of site		<ul style="list-style-type: none"> • Well set up • Easy to navigate • Offers different array of topics than the student site. • Easy to get to. • Graphics are clear, good color, not "tacky" 	<ul style="list-style-type: none"> • Dictionary is nice. • Likes the colors. • Easy to find. 	<ul style="list-style-type: none"> • Attractive • More adult level than home page. • Was busy on comment section and didn't have chance to get to assigned page. 	<ul style="list-style-type: none"> • Easy navigation. • Pointed to Curriculum and Background information and clicked on Curriculum and other places.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
4. Other Comments		<ul style="list-style-type: none"> • Thinks it would be easy to get to the EPA site from a search engine, but not necessarily to the Teacher site. • When searching, starts with “EPA” or “environment” and works her way from there. • Was not frustrated by the fact the site isn’t broken down by grade level. The teacher can always adjust it. 	<ul style="list-style-type: none"> • Start with EPA on search functions. 		
Task 1 - Please go to the EPA home page at www.epa.gov. Search for environmental information that is at an appropriate level for your students.					
General Paths Tried	<ul style="list-style-type: none"> • epa.com • www.epa.com • www.epa.gov • Went to students site rather than the teachers site. 	<ul style="list-style-type: none"> • Audience groups • Students • Waste & Recycling • Zip Code • Looked up a few sites. 	<ul style="list-style-type: none"> • Searched using term “clean water” • Scanned results • Chose Great Lakes because this is part of their curriculum. 	<ul style="list-style-type: none"> • Browsed EPA topics • Looked at P2 and recycling • Looked at OSW site • Recycling process • MSW program page • Composting 	Teacher not available for this question.
User Attitude	<ul style="list-style-type: none"> • Confusion 	<ul style="list-style-type: none"> • Effortless • Back button use 	<ul style="list-style-type: none"> • Frustrated • Back button use 	<ul style="list-style-type: none"> • 	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Graphic s Comments		<ul style="list-style-type: none"> • Clear • Simple 	<ul style="list-style-type: none"> • Too much text. Need more pictures (I think this relates to EPA home page.) 		
Disappointment Comments	<ul style="list-style-type: none"> • Hard to find the site from the EPA home page. • Wasn't instinctive to look under audience groups. 		<ul style="list-style-type: none"> • Required too many steps. 	<ul style="list-style-type: none"> • Haven't seen anything on 10 year old level. 	
Technical Difficulties	<ul style="list-style-type: none"> • Long wait for pages to load. 	<ul style="list-style-type: none"> • Long wait for pages to load 			
Other Comments		<ul style="list-style-type: none"> • Felt it was easy. • Appreciated the zip code option so they can look up info in their area. • Liked that user can incorporate geography. As a self-contained classroom, she has to teach all topic areas. • Likes to go to student site more than teacher site because she can see what the students will be looking at. • EPA web site can be used as a cross-curriculum resource. 	<ul style="list-style-type: none"> • Ended up on great lakes site, with environmental information appropriate for her students, but didn't find the Teacher site. 		
Task Completed?	No	Yes	No	No	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Task 2 - Find a site where you can search for EPA publications on a variety of environmental topics.					
Paths Tried	<ul style="list-style-type: none"> • Publications • Online Publications • NCEPI home page • Search 	<ul style="list-style-type: none"> • Publications • NCEPI • Publications On-line • NCEPI 	<ul style="list-style-type: none"> • Publications • NCEPI • Searched NCEPI for publications on water 	<ul style="list-style-type: none"> • Publications • On-Line Publications 	<ul style="list-style-type: none"> • Publications • NCEPI • Searched for recycling and got 32 hits.
User Attitude	<ul style="list-style-type: none"> • Confusion. The participant got lost on the NCEPI page - when using the search button, it brought him to the main EPA search engine. 	<ul style="list-style-type: none"> • Effortless (found link quickly and easily) • Back button use (frequently used to get back to starting point) 	<ul style="list-style-type: none"> • Back button use 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Found site easily.
Graphic s Comments			(e.g., physics, ecosystem, aquifer, pollution, garbage, recycling)		
Disappointment Comments		<ul style="list-style-type: none"> • When click on reports, does not go into the reports. 	<ul style="list-style-type: none"> • Aren't the publications available on-line? Couldn't have kids use this site for research. 	<ul style="list-style-type: none"> • Couldn't find anything on worms. 	<ul style="list-style-type: none"> • Some confusion between the NSCEP site and on-line publications, and which provided publications that she can print out.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Technical Difficulties		<ul style="list-style-type: none"> On-line ads popped up frequently while on the on-line publications page. One ad was for casinos, and participant commented that it wouldn't be helpful for students to see this. The ads made it ultimately difficult to find a site with a publication. 			
Other Comments		<ul style="list-style-type: none"> Impressed with foreign language option on NSCEP. Searched Spanish publications. 		<ul style="list-style-type: none"> It is easy to print these publications at school. Good for students so they don't have to order through the mail. Some sites are way above the students' levels. Nothing in particular strikes her fancy. She can correlate some of the info to current topics. 	
Task Completed?	Yes (observer checked "no," but it appears the participant did find the publications pages but then had trouble using them.	Yes	Yes	Yes	Yes

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Task 3: Find information about how your school can apply for a grant to fund an idea you have for an environmental education project.					
Paths Tried	<ul style="list-style-type: none"> • Grants • Eelink.net (normally goes to the first link on each page until gets to info he needs) • www.turner.com/cpf/ (This was first link from eelink.net) • www.cleanaircommunities.org/rpf-submission.html 	<ul style="list-style-type: none"> • Grants • Grant resources (ee.link site) and browsed different titles. Clicked on K-12 and appreciated that it narrowed things down. Liked the graphics and organization on ee-link. • Was asked to find EPA grant program, and clicked on grant-writing tutorial. • Back to eelink. • Searched using "EPA" • Did not get a clear link to EPA grant program. 	<ul style="list-style-type: none"> • Grants • EPA grant program • List of grants awarded by state • OEE guidelines page • Eelink site 	<ul style="list-style-type: none"> • Grants • Grant writing tutorial 	<ul style="list-style-type: none"> • Grants • Read all the site descriptions. • Selected EPA grant program. • Read the page and clicked on Solicitation Notice.
User Attitude		<ul style="list-style-type: none"> • Frustrated 	<ul style="list-style-type: none"> • Effortless 		<ul style="list-style-type: none"> • Effortless
Graphic s Comments					
Disappointment Comm ents					
Technical Difficulties				<ul style="list-style-type: none"> • Transfer interrupted messages. 	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Other Comments	<ul style="list-style-type: none"> Never got to the EPA grant program because he got “stuck” at the eelink site. Found the grant writing tutorial from eelink. 	<ul style="list-style-type: none"> Liked the eelink site. In EPA grant site, particularly liked section on “tips.” Linked to OEE “Guidelines and Assessments” and thought it offered additional grant-writing tips. 	<ul style="list-style-type: none"> Thought the task was interesting. Liked the OEE Guidelines - it is good to have goals identified. 	<ul style="list-style-type: none"> Comments about the EPA grant writing tutorial: “Next” button hard to find. It should be in right corner. It is not clear where to click. It’s too complicated. Can’t figure out the way to get program. Bogs down on setting up the browser to work with frames. Spends a lot of time explaining the program. Clicked on Purdue U. Get rid of bottom graphics of people. Need a Basic 101 section. She’s never written a grant before. Like computer guy. 	<ul style="list-style-type: none"> No problem with PDF format and Adobe Acrobat. Likes that she can type directly onto grant form on-line and then print it out. Checked out other sites (Guidelines and Assessments, and EETAP page) and looked at it some detail.
Task Completed?	No	Partially (found grant information but not EPA grant site on her own).	Partially (Found EPA grant page but didn’t actually go to section that describes how to apply.)	No (although got to tutorial)	Yes

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Task 4: Please find a specific elementary grade-level classroom activity that you could use for a unit on water quality.					
Paths Tried	<ul style="list-style-type: none"> • Curriculum • Water • Looked at each link down the line. 	<ul style="list-style-type: none"> • Curriculum • Water • Looked through links until found “Activities” • Water Treatment Process 		<ul style="list-style-type: none"> • Curriculum • Water 	<ul style="list-style-type: none"> • Curriculum • Water • SDWA 25 Anniv. (Broken Link) • World of Fresh Water (PDF file, used “find” to look for water quality. Found some experiments for her age group) • Back to Water and found the Activities section. • Chesapeake Bay game.
User Attitude	<ul style="list-style-type: none"> • Frustrated • Confusion • Back button use 	<ul style="list-style-type: none"> • Effortless 	<ul style="list-style-type: none"> • Effortless • Back button use 	<ul style="list-style-type: none"> • Frustrated 	
Graphics Comments		<ul style="list-style-type: none"> • Like the graphics. Thinks they are clear. 	<ul style="list-style-type: none"> • Liked the graphics found on ecosystems. • P2 Toolbox had too much text. Needs more graphics. Would be better in an outline format. 	<ul style="list-style-type: none"> • Consolidate so there’s only one screen. • Likes exit EPA icons. 	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Disappointment Comments	<ul style="list-style-type: none"> Hit a few broken links and couldn't understand why. 			<ul style="list-style-type: none"> Some links didn't mention grade or age level. Not all her students read at 4th grade level. Would like bilingual sites at 4th grade level. Didn't like scrolling down. Didn't indicate existence of bilingual information. 	
Technical Difficulties	<ul style="list-style-type: none"> Broken link (Safe Drinking Water Act 25th anniversary) Other - got a lot of advertising downloads, especially from sites outside EPA. 	<ul style="list-style-type: none"> Broken link (Pollution Drawing Gallery) 		<ul style="list-style-type: none"> Transfer interrupted or content contains Netscape 3.0 messages. 	<ul style="list-style-type: none"> Two broken links (including Broken link the SWDA 25th Anniversary site.)

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Other Comments	<ul style="list-style-type: none"> Was at the right section, but spent time at each linked site and so never made it to the destination site. 	<ul style="list-style-type: none"> Liked the Water Treatment Process site a lot. Liked the mouse-over feature and the word scramble approach - could turn into a game. This site would have been helpful when she covered where water comes from. Could use in science and have kids draw the treatment process. Also went to Surf your Watershed. Liked opportunity to get local information and liked atlas function for geography infusion. Good learning level for her 7th graders. 	<ul style="list-style-type: none"> Would like to see grade levels when get to list of links. 	<ul style="list-style-type: none"> Likes the "Exit EPA" icon. 	<ul style="list-style-type: none"> Difficulty reading from screen so would print out PDF document. Took a while to find the Activities section of the Curriculum/Water page. Liked the Chesapeake Bay game but wondered where all the puzzle pieces were. Thought that the page contained a bit of information/lots of resources. Didn't realize this was available for the teachers.
Task Completed?	No	Yes	Yes	No	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Task 5: You have decided to prepare a lesson plan for your 8th grade class on global climate change and how it affects the environment. Can you find two sources to help with your curriculum development?					
Paths Tried	<ul style="list-style-type: none"> • kids.earth.nasa.gov/hames/toms/ 	<ul style="list-style-type: none"> • Curriculum • Conservation • P2 Toolbox • Back • Back • Curriculum • Human health • Project A.I.R.E. 	<ul style="list-style-type: none"> • Curriculum • Searched on “global climate change” • Found nothing 	<ul style="list-style-type: none"> • Curriculum • Not sure if it is Air, so try Human Health • Project A.I.R.E. 	<ul style="list-style-type: none"> • Curriculum • Ecosystems (after some thought) • Teacher Guide to Global Change - broken link. • El Nino and La Nina
User Attitude		<ul style="list-style-type: none"> • Confusion • Back button use 		<ul style="list-style-type: none"> • Confusion 	
Graphics Comments					
Disappointment Comments		<ul style="list-style-type: none"> • Slightly confused with single “click options.” 			
Technical Difficulties					
Other Comments		<ul style="list-style-type: none"> • Time ran out, but she didn’t easily find the topic of “global warming.” 			
Task Completed?	No	No (found one site)	No	No (found one site)	No

Summary of Focus Group and User Test Results
EPA Environmental Education Center Web Site
Wilson High School, Washington D.C.

Task/Data	Participant 1	Participant 2	Participant 3
Pre-Test Questions			
Grade	9-12	High School	9-12
WWW Experience	Advanced	Beginner	Intermediate
Freq. Of Use	Once/day	Once/day	>Once/day
Connect Speed	Fast (96.6 kps)	Slow	Slow
Used Teacher Center Site?	No	No	No
What would you expect to find on site?	Information on: <ul style="list-style-type: none"> • Water conservation • endangered species • preservation of rain forests • nuclear waste 	Issues related to environmental science and energy.	Information on: <ul style="list-style-type: none"> • Teacher resources • Worksheets • Articles • Field trip ideas.
Post-Test Questions			
Were the task questions type of info you'd look for?	Yes	Yes	Yes
Use Search Too!	Yes	Yes	Yes
What info would bring you back to site?	No answer	To find information.	Activities
How did you feel when performing a task?	Knew where I was (somewhat)	No answer	Knew where I was

Task/Data	Participant 1	Participant 2	Participant 3
Would it be easy or difficult to find info that interests you on the site?	Easy (somewhat)	“Not too difficult”	Easy to find
It was easy to find info on home page:	Some of the time	Some of the time	Most of the time
Info flowed logically:	Some of the time	Most of the time	Most of the time.
I'd like the site to have:	No answer	<ul style="list-style-type: none"> • Key words in bold lettering (in color) • Because a good deal of reading is required, try to avoid having key terms imbedded in the text. 	No answer
Focus Group Questions			
Browser	Explorer	Explorer?	Explorer
1. How begin search/favorite search engines and search terms?	<ul style="list-style-type: none"> • Yahoo • MSN • Excite 	<ul style="list-style-type: none"> • No answer • Search by subject 	<ul style="list-style-type: none"> • MSN • Search by topic
2 Would you come back to this site? Why?	<ul style="list-style-type: none"> • Yes • There is a wealth of information on a variety of topics. • Would like to come back for community service projects. 	<ul style="list-style-type: none"> • Yes • Lots of information • It's a major resource for environmental information. • Need to market it to schools better - send a notice to schools describing the site. 	
Is it easy to use?	<ul style="list-style-type: none"> • Yes • But very tough to find the site directly from the EPA home page. • The information was not as quickly accessible as it could be. 	<ul style="list-style-type: none"> • Need to focus on the key search words and put them in bold. 	

Task/Data	Participant 1	Participant 2	Participant 3
Did you understand the information you found?	<ul style="list-style-type: none"> • Yes, <u>once</u> you found it. • Language needs to be straight and to the point. 	<ul style="list-style-type: none"> • It was tough to find the path to answers. • Difficulty in understanding is due to lay out of the site. • Would be easier if topics were in outline form. 	
Does site contain interesting and /or useful information?	<ul style="list-style-type: none"> • Yes 	<ul style="list-style-type: none"> • Difficult to understand due to the confusing site lay out. 	<ul style="list-style-type: none"> • Site is full of material that would be applicable in a senior high school class.
Do you like the design and colors?	<ul style="list-style-type: none"> • Yes 		
Do you like the graphics?	<ul style="list-style-type: none"> • Yes, really like the graphics, pictures, etc. 		
Are site descriptions clear and complete?	<ul style="list-style-type: none"> • Yes 		
Do site descriptions give a good idea of site contents?	<ul style="list-style-type: none"> • Yes 		
Would you make any changes?	<ul style="list-style-type: none"> • Less text and heavy explanations. 	<ul style="list-style-type: none"> • Ensure that all key words are used in site/link descriptions. 	
Task 1 - Please go to the EPA home page at www.epa.gov. Search for environmental information that is at an appropriate level for your students.			
General Paths Tried	<ul style="list-style-type: none"> • Looked at EPA home page and found Sunwise program/Educators information • Saw the Kids link but didn't know there is also a Teachers page 	<ul style="list-style-type: none"> • Information sources • Audience groups • Teachers • Then looked at endangered species, fish and wildlife, EPA laws, and ?? quality (for AP class) 	<ul style="list-style-type: none"> • Browsed EPA home page (water, dumping), clicked on Office of Environmental Education and then stumbled onto the Teachers' site link.

Task/Data	Participant 1	Participant 2	Participant 3
User Attitude	<ul style="list-style-type: none"> • Confusion • Back button 	<ul style="list-style-type: none"> • Effortless 	<ul style="list-style-type: none"> • Back button
Graphics Comments			
Disappointment Comments			
Technical Difficulties			<ul style="list-style-type: none"> • Long wait for pages to load.
Other Comments	<ul style="list-style-type: none"> • Liked the Sunwise page/program. Thinks it is a good concept and important to teach kids about ultraviolet radiation and its effect on the skin. 	<ul style="list-style-type: none"> • She has used the site to get information on environmental laws. It is a good resource for her AP class. 	
Task Completed?	No	Yes	Yes

Task/Data	Participant 1	Participant 2	Participant 3
Task 2 - Find information about how your school can apply for a grant to fund an idea you have for an environmental education project.			
Paths Tried	<ul style="list-style-type: none"> Found with little difficulty 		<ul style="list-style-type: none"> Grants/EPA Environmental Education Grant Program/Solicitation Notice
User Attitude			<ul style="list-style-type: none"> Back button
Graphics Comments			
Disappointment Comments	<ul style="list-style-type: none"> Concerned that the actual solicitation is on pdf. "What if someone does not have .pdf?" The information about grants is confusing. There is too much information. Should give the steps (1, 2, 3) for how to apply. It was easy to read but difficult to comprehend because there was too much information. 	<ul style="list-style-type: none"> There is too much to read on the grant site. The site is confusing. Participant got to site but wasn't sure if she was actually there. Wording needs improvement. 	
Technical Difficulties			
Other Comments	<ul style="list-style-type: none"> Other than the comment about wanting a more simplified description of how to apply, the participant felt the grant site was easy to understand and "not too overwhelming." 	<ul style="list-style-type: none"> Keep the wording as basic as possible - e.g., "Applying for a Grant". 	<ul style="list-style-type: none"> Need something to draw attention to key areas besides bold lettering - perhaps something flashing.
Task Completed?	Yes	No	Yes
Task 3: Look for information about environmental jobs and internships available for your high school students.			
Paths Tried	<ul style="list-style-type: none"> Went to EPA program offices. 	<ul style="list-style-type: none"> Tried Programs and Information Sources at EPA home page Returned to Teachers site Went to Office of Personnel Management; did not realize she was at OPM. 	<ul style="list-style-type: none"> OEE/Student Opportunities Kids' Page EPA search Environmental Careers Resource Guide (was apparently searching from the EPA home page.)
User Attitude	<ul style="list-style-type: none"> Frustrated 		

Task/Data	Participant 1	Participant 2	Participant 3
Graphic s Comments			
Disappointment Comments	<ul style="list-style-type: none"> • Thought the informatio n was ridiculously difficult to find, and had no clue where to look. • Only reason she found the USGS site was that she already knew abo ut it. • Not easy to find high scho ol jobs. There is no code to distinguish between college and high school. 	<ul style="list-style-type: none"> • Description at EPA home page under Audience Groups/Teachers is too limited - should provide information. 	<ul style="list-style-type: none"> • Cue on web site for Internships should be more identifiable.
Technical Difficulties			
Other Comments		<ul style="list-style-type: none"> • Started at EPA home page and found way back to Teachers' site. 	
Task Completed?	No	No	No
Task 4: Please find a specific high school-level classroom activity that you could use for a unit on hazardous waste.			
Paths Tried		<ul style="list-style-type: none"> • Curriculum/Waste & Recycling/studies colors?? 	<ul style="list-style-type: none"> • Curriculum/Human Health/Project AIRE?? • Curriculum/Waste & Recycling/Hazardous Waste:Superfund/Activities
User Attitude	<ul style="list-style-type: none"> • Effortless 		<ul style="list-style-type: none"> • Back button
Graphic s Comments			
Disappointment Comments			
Technical Difficulties			

Task/Data	Participant 1	Participant 2	Participant 3
Other Comments	<ul style="list-style-type: none"> • Site seems age appropriate. • Lesson plans are set up very nicely. It tells you exactly what you need to do and is very informative. 	<ul style="list-style-type: none"> • .Did find information that is interesting and would use for reviews and assignments. • But didn't find the site on hazardous waste. 	<ul style="list-style-type: none"> • Liked the activity she found and thought the site was straight forward. • Site is full of material that would be applicable in a senior high school class.
Task Completed?	Yes	No	Yes

Task/Data	Participant 1	Participant 2	Participant 3
Task 5: You have decided to prepare a lesson plan for your class on global climate change and how it affects the environment. Can you find two sources to help with your curriculum development?			
Paths Tried	<ul style="list-style-type: none"> • Went to “Search” and found zero items. • Curriculum/Air, but didn’t click on Project AIRE • Went back to epa.gov search engine. 	<ul style="list-style-type: none"> • Curriculum/Air/Project AIRE/back to Air/Ozone Graphing Game • EPA.gov/OMSWWW/Quiz/Quiz-env.htm to Environmental Atlas (?) 	<ul style="list-style-type: none"> • Curriculum/Ecosystems/El Nino
User Attitude	<ul style="list-style-type: none"> • Frustrated • Slight Confusion • Back button 	<ul style="list-style-type: none"> • Lost 	
Graphics Comments			
Disappointment Comments	<ul style="list-style-type: none"> • Project AIRE description says nothing about “global climate change” 	<ul style="list-style-type: none"> • Project AIRE site should explicitly say (k-12) after A.I.R.E. • Project AIRE site description of topics covered is not sufficient. 	<ul style="list-style-type: none"> • “Global Warming” is listed as a topic under Ecosystems but not in “air” or in “Project AIRE” (although it does mention “ozone.” • Global Change Teachers Guide not available.
Technical Difficulties			
Other Comments			
Task Completed?	No	No	No

Task/Data	Participant 1	Participant 2	Participant 3
6. Find a site where you can search for EPA publications on a variety of environmental topics.			
Paths Tried		<ul style="list-style-type: none"> • Got lost trying to find answer. 	<ul style="list-style-type: none"> • Publications/On-line publications (because it contained the word “publication”)
User Attitude		<ul style="list-style-type: none"> • Confusion 	
Graphics Comments			
Disappointment Comments			
Technical Difficulties	<ul style="list-style-type: none"> • Left side-bar was not visible on the computer screen. 	<ul style="list-style-type: none"> • Problem with left side-bar. 	
Other Comments			
Task Completed?	No	Skipped question because of technical difficulties.	Yes (because found some publications)
7. Find an idea for a community service project that you and your students could implement to encourage recycling in your area.			
Paths Tried		<ul style="list-style-type: none"> • Community Service Projects 	<ul style="list-style-type: none"> • Community Service Projects/Tools & Resources for a Livable Community/Service-Learning: Education Beyond the Classroom.
User Attitude	<ul style="list-style-type: none"> • Effortless 		<ul style="list-style-type: none"> • Back
Graphics Comments			
Disappointment Comments		<ul style="list-style-type: none"> • Was looking for key word “recycling” • Too much reading • pdf file did not open • On Livable Communities page, did not realize she is no longer at EPA site. 	
Technical Difficulties	<ul style="list-style-type: none"> • Don’t have Adobe Acrobat reader so couldn’t download .pdf file. 	<ul style="list-style-type: none"> • Don’t have Adobe Acrobat reader so couldn’t download pdf file. 	<ul style="list-style-type: none"> • Long wait for pages to load • Don’t have Adobe Acrobat reader so couldn’t download pdf file.

Task/Data	Participant 1	Participant 2	Participant 3
Other Comments			
Task Completed?	Would have found it if had Acrobat	No	Would have found it if had Acrobat
8. What are three types of ionizing radiation?			
Paths Tried	<ul style="list-style-type: none"> Went to "Air" page first. Wasn't really clear to look under "Human Health" 		<ul style="list-style-type: none"> Looked at Background, Left side-bar, and Curriculum.
User Attitude	<ul style="list-style-type: none"> Frustrated Confusion 	<ul style="list-style-type: none"> Confusion at first. 	<ul style="list-style-type: none"> Back button
Graphics Comments			
Disappointment Comments	<ul style="list-style-type: none"> "Ugh, I'm not a science teacher...." 		
Technical Difficulties			<ul style="list-style-type: none"> Long wait for pages to load Page did not load Computer "jammed"
Other Comments		<ul style="list-style-type: none"> Found information at a different location outside Teachers' site. 	
Task Completed?	No	Yes	No

APPENDIX 3

**EPA *ENVIRONMENTAL EDUCATION CENTER*
USER TEST SITE INFORMATION**

**Environmental Education Web Sites
User Testing Locations, Target Audience, and Site Contacts**

Testing Location	EPA Web Site Tested	Target Audience	No. Tested	School Name and Address	School Principal	Main Contact
Arlington, VA	<ul style="list-style-type: none"> • Explorers' Club 	<ul style="list-style-type: none"> • 4th -5th grade 	<ul style="list-style-type: none"> • 7 	Jamestown Elementary School	Ms. Laura Annan	Ms. Laila Gore Ms. Janet Hudgens
Chicago, IL	<ul style="list-style-type: none"> • Student Center • Environmental Education Center 	<ul style="list-style-type: none"> • 7th - 8th grade • Teachers (4th,7th,8th grades & computer) 	<ul style="list-style-type: none"> • 6 • 5 	Sandoval Elementary School 5534 S. St. Louis Avenue Chicago, IL 60629	Mrs. Anna Garcia-Berlanga	Ms. Marlene Woytonik
Falls Church, VA	<ul style="list-style-type: none"> • Explorers' Club 	<ul style="list-style-type: none"> • 3rd grade 	<ul style="list-style-type: none"> • 7 	Thomas Jefferson Elementary School	Mr. Greg Alexiou	Mr. Greg Alexiou
Washington, DC	<ul style="list-style-type: none"> • Student Center • Environmental Education Center 	<ul style="list-style-type: none"> • 10th-11th grade • Teachers (High School) 	<ul style="list-style-type: none"> • 5 • 3 	Woodrow Wilson High School 3950 Chesapeake St., NW Washington DC, 20016	Mr. Stephen Tarason	Ms. Andrea Thompson

APPENDIX 4


ENVIRONMENTAL EDUCATION CENTER HOME PAGE

Text

Welcome to EPA's ENVIRONMENTAL EDUCATION CENTER

 Background
Information


Contacts &
Other Links

 Curriculum
Resources &
Activities

Grants

 Community
Service
Projects

Awards

 Workshops &
Conferences

Student Jobs
& Scholarships

About EPA
Environmental
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Index
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Kids
Publications
Students

Home

Search

Comments

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URL: www.epa.gov/teachers/
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