Unit Plan : Conducting Cyber Research and Evaluating Technology
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Introduction:
This unit is designed to integrate aspects of the Maryland Voluntary State Curriculum (VSC) into an environmental science curriculum. Specifically, objectives relating to gathering information on-line, evaluating cyber sources, and evaluating technologies are addressed.

Purpose:
The purpose of this unit is to improve student skills in three areas of cyber research: finding sources, evaluating web sites and cyber ethics. Clearly, the starting point of cyber research is simply finding relevant sites. Second, students must critically evaluate web sites as they would any other research[1]. Third, we will address problems of cyber-ethics that arise when using on-line sources, including plagiarism and copyright violations.

Setting:
This unit is designed for a high-school level Environmental Science course. Since Environmental Science is an elective, there tends to exist a broad range of abilities among the students, between those who take the course to satisfy science requirements as an alternative to more difficult courses, and those who take the course concurrently with more difficult science courses out of an interest in the subject. Students ability in using technology is likely to be similarly diverse, between those with an interest and access to internet technology, and those disinterested and/or with limited access to computer resources.

Unit Outline:

Topic	Days	MD VSC Objective	Assessment
Finding Resources	1	SWBAT 1. find appropriate web sites for research on a current topic in environmental science by using search engines and following links and 2. collect information and evaluate its quality.	Questioning, activity
Evaluating Sites	1	SWBAT: 1. evaluate the authenticity and relevancy of web sites to a given topic by using a given set of criteria and 2. collect information and evaluate its quality.	observation, activity, worksheet
Cyber Ethics	1	SWBAT describe their responsibilities with respect to copyrights and plagiarism of materials (writings and images) found on-line by demonstrating appropriate use of resources.	Questioning
Final Project	2	SWBAT 1. apply knowledge of cyber research by completing a research project with written and visual components using only on-line resources, 2. collect information and evaluate its quality, 3. explain that selecting resources involves trade-offs between competing values, such availability, cost, durability, and waste, and 4. explain that humans devise technologies to reduce the negative consequences of other technologies.	Written Report with references

Part I: Finding Sources

In this section, I will address how to find sites about a topic on the internet. In the past, I have had a tendency to take it for granted that secondary students can find resources without guidance. However, this is a false assumption, and in my experience leads to time wasted, frustrated students, and incomplete or poorly-done assignments. It may also lead to students entering inappropriate sites with content not intended for children. For example, in a search for a picture of Spongebob Squarepant's home town, a friend did a Google Images search for "Bikini Bottom." The results were not child-appropriate.

Objective:
Students will be able to find appropriate web sites for research on a current topic in environmental science by using search engines and following links.

Materials:
- On-Line Research Reference Sheet (attached)
- LCD projector
- Computer lab with internet access

Assessment:
Students will be assessed for prior knowledge during the pre-assessment. Their learning will be monitored through continuous observation and questioning. The individual activity and wrap-up discussion will be used to determine student progress toward the objective.

Agenda:
1. Review of computer lab rules
2. Pre-Assessment
3. Guided Search
4. Individual Searching Assignment

1. Students will be asked to recall the rules of using the computer lab, including leaving all unnecessary items in a cubby, remain seated at their assigned station, and do not open any software or web sites that are used for entertainment, e-mail, chat, music, downloading, or otherwise not necessary for the classwork. These rules are posted around the lab.

2. Pre-Assessment
        Teacher will ask students to answer a short set of questions on a topic relevant to environmental science. Students will be given a short amount of time to search the internet for the answers. Those students who are able to answer the questions will be asked to share their techniques with the class.

3. Students will log out of their computers to focus attention on the teacher's computer output visible on a screen via LCD projector. We will first visit sites published by Google that provide both beginner and advanced search tips. Students will take notes summarizing the search tips.
http://www.google.com/support/bin/topic.py?topic=352

Teacher will hand out the reference sheet for students that provides a diagram of a web search result and information on domain types. Teacher will then conduct a search on ethanol, a topic relevant to environmental science, with student input based on the search tips. Teacher will demonstrate refining the search to find specific information and doing an initial evaluation of a site based on the information provided in the search results.

4. Students will choose a topic relevant to environmental science from a list provided by the teacher. Students will write a brief summary including search terms, screenshots of results, and list of web sites they chose.

Part II: Evaluating Sites

This lesson is designed to help students develop skills and appreciation for critically evaluating on-line sources. Since the internet is a global resource, it is open to anyone and anything can be posted without regard to authenticity [3,4]. It is therefore essential to critically evaluate web sites before using their site or information.

Objective:
Students will be able to select good on-line sources of information based on critical evaluation for authenticity, bias, relevance, audience, and other factors.

Materials:
- Web Evaluation Rubric (attached)
- LCD projector
- Computer lab with internet access

Assessment:
Students will be assessed for prior knowledge during the warm-up.

Agenda:
1. Warm-up question
2. Demonstration: TheOnion.com and examples of more devious fake sites
3. Guided Evaluation: Using a rubric to analyze a web site.
4. Individual Practice with rubric
5. Pair discussion of individual results
6. Closing class discussion

2. Teacher will show some examples of fake and phishing sites to students to demonstrate the necessity of evaluating web sites.

3. Teacher hands out evaluation rubric. Teacher and students conduct a search for web sites related to the environmental impact of ethanol. From the search results, we choose a web site and the entire class visits. Teacher, with student input, completes the evaluation rubric for the web site.

4. Students work individually to complete the evaluation rubric on one web site assigned by the teacher and one web site they found during their initial search.

5. Students in pairs compare their search and evaluation results.

6. Teacher leads group discussion as students share their evaluations and explain their reasoning behind the scores given.

Part III: Copyright, Fair-Use, And Plagiarism

In my experience, many secondary students do not have an adequate understanding of plagiarism, including both what it is, how to avoid it, and its consequences. It is vital for students to understand copyrights and plagiarism both in high-school and after they graduate, whether they enter the work for immediately or enter college. For example, at my previous high school the student may face a 0 on an assignment, an administrative referral, and/or rejection from the National Honor Society. I would be unlikely to write a recommendation for a student who had plagiarized. Outside of high school, the individual may face lawsuits for violating copyrights[7]. A University of Maryland student convicted of plagiarism receives a grade of XF for the course, a permanent scar on their record[8].

Objective:
Students will be able to use on-line resources legally by honoring copyrights within fair-use guidelines, citing sources and avoiding plagiarism.

Materials:
* Computer lab with internet access
* Printer with paper

Assessment:
Students will take a quiz on copyrights and receive a certificate if they pass, this will be printed and kept in the classroom as a reminder. Students will be assessed on plagiarism by looking at examples and seeing if they can distinguish proper use and plagiarism.

Agenda:
1. Warm-up: What does it mean to cite a source? How do you cite a source?
2. Notes on copyrights
3. Copyrights quiz
4. Notes on plagiarism and how to cite a web site
5. Examples of proper use and plagiarism

2. Notes on copyrights Students will take notes on copyrights from two sections of www.copyrightkids.org:
1. "What is a copyright?" http://www.copyrightkids.org/whatcopyframes.htm

2. "Copyright basics and FAQs?"http://www.copyrightkids.org/cbasicsframes.htm
Teacher points out section on fair use.

3. Students individually complete the copyright quiz and print the certificate when finished. http://www.copyrightkids.org/quizframes.htm

4. Teacher and students together visit and take notes on avoiding plagiarism from
www.kidshealth.org/kid/feeling/school/plagiarism.html

Students are directed to get out their Reference Sheet from the previous day. It includes a
section on how to cite websites[5].

5. Students as a group shown examples of proper use and plagiarism, but not told which
is which. Students are called upon by teacher to say whether they think an example is
proper or plagiarized, and explain their reasoning. If they are able to provide correct
answer with reasoning, student earns a bonus point.

Part IV: Report Using On-Line Resources

In the final two days of this unit, students will conduct on-line research to write a report
on the technology of corn-based plastics. In order to complete the assignment, students
must use the covered search strategies and obey all appropriate rules governing fair use
and plagiarism.

Objective:
Students will be able to apply knowledge of internet research, copyrights, and plagiarism
to research and analyze the pros and cons of an environmentally relevant technology.

Materials:
- Computer lab with internet access
- Printer with paper
- Student copies of the assignment

Assessment:
Students will be assessed based on the results of their research to include a written report
citing multiple web sites and evaluation of those web sites. Teacher will also monitor
student work to ensure proper progress and clarify misunderstandings. Students will be
graded on their analysis of a technology relevant to environmental science, the quality of
their research, and their adherence to cyber-ethics.

The successful student will:
- present a complete list of arguments *both for and against* the use of corn-based
  plastics, especially compared to the use of petroleum-based plastics.
- Discuss their original opinion on whether or not corn-based plastics are a viable
  and good technology for replacing petroleum-based plastics. The opinion MUST
  be supported by facts.
- Use resources that have been carefully evaluated for authority, objectivity, and
  relevance.
- Demonstrate good cyber-ethics by complying with fair-use guidelines, avoiding
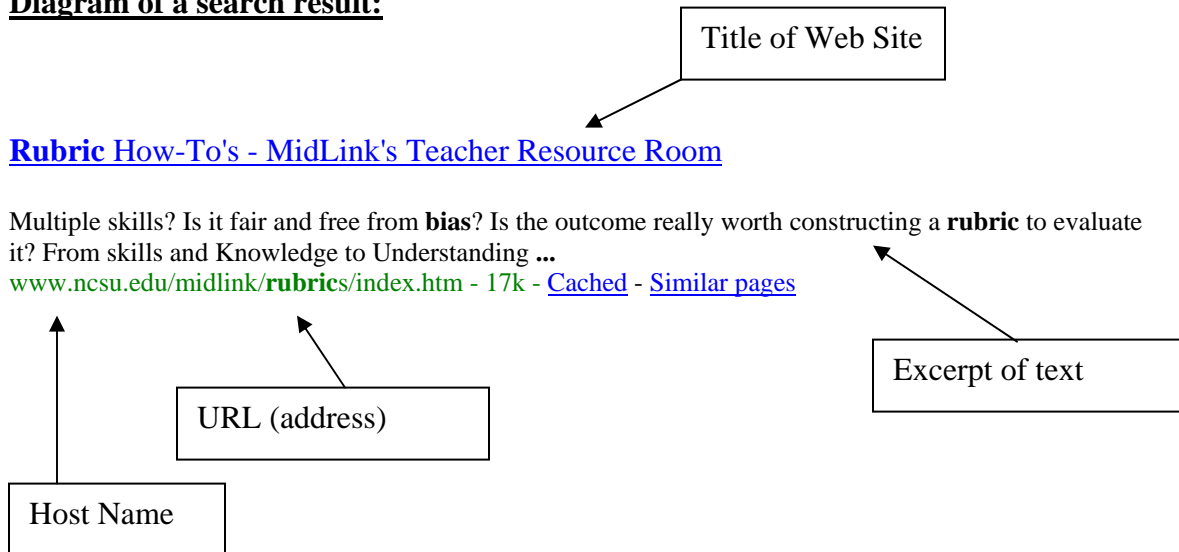 plagiarism, and properly citing all sources.

Attachments

1. References

2. On-Line Research Reference Sheet

3. Web Site Evaluation Rubric (SEPARATE FILE)
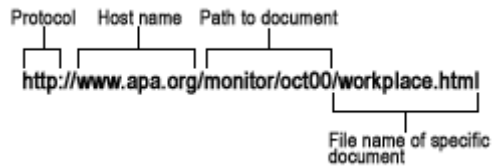
4. Final Report Hand-Out

REFERENCES

1. Critically Analyzing Information Sources, 2004, Cornell University Library,
http://www.library.cornell.edu/olinuris/ref/research/skill26.htm

2. Maryland Technology Education Voluntary State Curriculum, 2005, Maryland State
Department of Education

3. An Educator's Guide to Credibility and Web Evaluation, 2002, Josh Brown et. al.,
http://lrs.ed.uiuc.edu/wp/credibility/index.html

4. Evaluating Web Sites, 2006, University Libraries University of Maryland,
http://www.lib.umd.edu/guides/evaluate.html

5. Electronic References, 2001, American Psychological Association
http://www.apastyle.org/elecmedia.html,

6. What Is Plagiarism?, 2006, Nemours Foundation,
 http://www.kidshealth.org/kid/feeling/school/plagiarism.html

7. Copyright Office Basics, 2006, U.S. Copyright Office,
http://www.copyright.gov/circs/circ1.html

8. Academic Integrity for Undergraduate Students, 2006, UM Libraries User Education
Services, http://www.lib.umd.edu/guides/integrity_ug.pdf

ON-LINE RESEARCH REFERENCE SHEET

Diagram of a search result:

Title of Web Site

Rubric How-To's - MidLink's Teacher Resource Room

Multiple skills? Is it fair and free from **bias**? Is the outcome really worth constructing a **rubric** to evaluate it? From skills and Knowledge to Understanding **...**
www.ncsu.edu/midlink/**rubric**s/index.htm - 17k - Cached - Similar pages

Excerpt of text

URL (address)

Host Name

Diagram of a URL: From http://www.apastyle.org/elecmedia.html

Protocol   Host name   Path to document

http://www.apa.org/monitor/oct00/workplace.html

File name of specific document

Domain types:
The abbreviations in a web site's host name, called the "top-level domain" (TLD), can indicate the type of organization sponsoring the site and what country they are from. This is a short list of the most common types from the Internet Assigned Numbers Authority (IANA):

.edu   colleges and universities
.org   non-profit organization, but can be obtained by individuals
.com   a for-profit company, but can be obtained by individuals
.gov   U.S. government web site
.net   Internet service provider (ISP) or web-site hosting company, also can be obtained by individuals

For information on other TLDs, visit http://www.iana.org/gtld/gtld.htm If you come across a two-letter abbreviation, it is likely a country-code TLD (ccTLD) for the country of origin. For example, .uk indicates the United Kingdom, and .ca stands for Canada. This link will show you the complete list of country codes in alphabetical order. http://www.iana.org/cctld/cctld-whois.htm

Citing a website
According to the Publication Manual of the American Psychological Association:

When citing a website, you should include:
- Title of the site
- Date of publication (or the date you used the site, indicate which)
- URL
- Author

Electronic References, 2001, American Psychological Association
http://www.apastyle.org/elecmedia.html

RESEARCH PROJECT USING ON-LINE RESOURCES

Topic: Evaluating Technology: "Green Plastic"

We have previously discussed the environmental impact of petroleum mining and the prospects of gasoline alternatives. But did you know that, just like gasoline, plastic is a product of petroleum? And, just like corn is used to make the gasoline-alternative ethanol, corn can be used to make plastic.   Your assignment is to research the economic and environmental pros and cons of corn-based plastics using only the internet. Try to find a variety of sources, so you can check for bias and have a balanced report.

Hand in:
You will have two class periods in the computer lab to complete this assignment. At the end of the second period, you should hand in:

1. A written report, at least two pages, including:
> A. An analysis of the pros and cons of plastics-based *relative to* petroleum-based plastics. Your analysis should include both economic and environmental considerations.
> B. *Your opinion*, supported by the facts, on whether or not corn-based plastic is a desirable and viable technology.
> (30 points)

2. Completed evaluation rubrics for two of the websites you reference. (5 points *each*)

3. Full citation of all sites used in your research using APA guidelines. See your reference sheet for what this includes and an example. You must have at least 4 sources. (10 points).