A Trail To Every Classroom (TTEC)
Curriculum Development Tool

UNIT DESIGN COVER SHEET

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Title: Sugar Hollow Wetlands Interpretative Guide Using Smart-Phone Technology

Abstract/Vignette: It is our intent to work with the students to develop an interpretative guide to be used by them as well as the public at Sugar Hollow Wetlands on school grounds. While they are creating this tool, they will also be gaining knowledge and appreciation about the flora and fauna of the local area.

Grade level(s): Please check all that apply.
- [ ] K-2
- [ ] 3-5
- [ ] 6-8
- [x] 9-12
- [ ] College and Lifelong Learning

Discipline: Please check all that apply.
- [ ] Art and Music
- [ ] Health and PE
- [ ] Foreign Language
- [x] Literature and Language Arts
- [ ] Mathematics
- [x] Science
- [x] Social Studies and Geography
- [ ] History
- [x] Technology

Year Developed: 2010

Period (month, week, year): Year

Teaching environment:
- [x] In the Classroom (indoors)
- [x] Outdoors
- [ ] In the Community
- [ ] Online/Virtual
Project Name: Sugar Hollow Wetlands Interpretative Guide
Teachers: Jane Fleenor and Elizabeth Fairbanks
Grade Level: High School
Time Frame: Initiate Fall 2010 and continue through the school year.

BACKGROUND- Our students live in the southern Appalachians which allow them the opportunity to study the vast diversity which surrounds them. Sugar Hollow is a city park which is located adjacent to our school campus and our students are able to walk to it and study the variety of habitats. The park has an established wetland area with a boardwalk through the area but lacks an interpretative guide for students and the public.

BIG IDEA- It is our intent to work with the students to develop an interpretative guide to be used by them as well as the public. While they are creating this tool, they will also be gaining knowledge and appreciation about the flora and fauna of the local area.

STATE STANDARDS-

BIO.1 The student will plan and conduct investigations in which
a) observations of living organisms are recorded in the lab and in the field;
i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results;
j) research utilizes scientific literature;
m) a scientific viewpoint is constructed and defended (the nature of science).

BIO.4 The student will investigate and understand relationships between cell structure and function. Key concepts include:
b) exploring the diversity and variation of eukaryotes

BIO.5 The student will investigate and understand life functions of archaeabacteria, monerans (eubacteria), protists, fungi, plants, and animals including humans.

BIO.8 The student will investigate and understand how populations change through time. Key concepts include

b) how genetic variation, reproductive strategies, and environmental pressures impact the survival of populations
c) how natural selection leads to adaptations;
d) emergence of new species
BIO.9  The student will investigate and understand dynamic equilibria within populations, communities and ecosystems. Key concepts include:

   a) interactions within and among populations including carrying capacities, limiting factors, and growth curves;
   b) nutrient cycling with energy flow through ecosystems
   c) succession patterns in ecosystems
   d) the effects of natural events and human activities on ecosystems; and
   e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems

ESSENTIAL QUESTIONS-

   1) What are the native species?
   2) What has been introduced?
   3) What role do the protozoa play in the wetland?
   4) What birds are migratory vs. year round residents?
   5) What amphibians and reptiles are present?
   6) What mammals use the wetland area for a habitat?
   7) What is the importance of the wetland?
   8) What fungi play a role in decomposition?

STUDENT ROLE-YOUTH VOICE-

   The development of the interpretative guide will require the students to take on leadership roles, even though it is teacher driven. It will open the door for student research, planning and implementation. The students will take on roles including:

   Researcher
   Photographer
   Artist
   Manual Labor
   Teacher/Mentor

COMMUNITY CONNECTIONS-

   This project will address a need in our community. Many people use the trails through the wetlands for health and well-being; however, they are not aware of the benefits that wetlands are to the local environment or, to the vast diversity and abundance of flora and fauna within the wetland ecosystem. Wetlands are extremely important not only as a nursery for many organisms, but also as a buffering/filtering system for the watershed.
Students will address this need by:
- mapping the wetland area
- building and establishing interpretative signage
- developing an interpretative guide
- building a kiosk to hold guides, put a large map and pictures of flora and fauna.

SKILLS AND HABITS OF MIND-

Students will gain many academic as well as life skills through this project. These will include:

- learning to use field guides
- learning to use dichotomous keys
- learning to be good stewards of the environment
- understanding the ecology of a wetland ecosystem
- learning practical uses of technology; ie. GPS
- learning to develop and interpret maps

SERVICE PROJECT-

Students will develop interpretative guides, build and establish interpretative signage, as well as, build and establish a kiosk.

The Interpretative Guide will be a tri-fold brochure which shall include

* pictures and general information (including common and scientific names) about some of the primary flora and fauna of the wetland area

* a map illustrating the layout of the trail through the wetland with a numbered guide to the featured plants and/or animals

* introductory information about the importance of wetlands and why we need to be good stewards by helping to maintain the productivity of it.

Partnerships & Benefits-

We are fortunate to have several organizations locally who we hope to partner with to see our project to completion. These include:

Bristol Parks and Recreation
Bristol Bird Club
John S. Battle Agriculture and Horticulture departments
Alpha Natural Resources
Retired Biology Professors  
Local Hiking Clubs  
The Nature Conservancy  

Resources-  
The students will be able to use the following resources for research and in the development of their guides:  

- Science textbooks  
- Peterson Field Guides  
- Dichotomous Keys  
- GPS Units  
- Park Maps  
- Leave No Trace Activities Guides  

MODELS AND EXAMPLES-  
The students will study and review interpretative guides, trail maps, and kiosks for other local trails and parks to learn what the project is going to entail. By getting the students out on the local trails at the Sugar Hollow Wetlands area, our hope is that this will lead them to explore other trails such as the Appalachian Trail.  

FINAL CELEBRATION-  
The final celebration will be the placement of the interpretative signage, the printing of the interpretative, and the building of the kiosk. We hope to accomplish these goals by Earth Day, April 22, 2011. We will submit a picture with a write-up to our local newspaper to highlight what our students have accomplished.  

EVALUATION OF THE UNIT  
We will evaluate the success of our project by the utilization of the interpretative guides, feedback from the public, and feedback from the students.
**Project Name:** Sugar Hollow Wetlands Interpretative Guide Using Smart-Phone Technology

**Teacher:** Andrea Helton

**Grade Level:** High School

**Time Frame:** Initiate fall 2011 and continue through school year

**Background:** Our students live in the southern Appalachians which allows them the opportunity to study vast diversity around them. Sugar Hollow is a city recreational park located within walking distance from our school. The park offers opportunities for the studying of local flora and fauna, as well as an established wetland with boardwalk.

**Big Idea:** The urbanization of rural areas can have an impact on the communities' water quality and natural eco-system. By developing an interpretative guide the students will gain the knowledge and appreciation of local flora and fauna while informing the public about the uses and benefits of this wetland.

**State Standards:**

ES.8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include

a) processes of soil development;
b) development of karst topography;
c) relationships between groundwater zones, including saturated and unsaturated zones, and the water table;
d) identification of sources of fresh water including rivers, springs, and aquifers, with reference to the hydrologic cycle;
e) dependence on freshwater resources and the effects of human usage on water quality; and
f) identification of the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries.

BIO.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations of living organisms are recorded in the lab and in the field;
b) hypotheses are formulated based on direct observations and information from scientific literature;
c) variables are defined and investigations are designed to test hypotheses;
d) graphing and arithmetic calculations are used as tools in data analysis;
e) conclusions are formed based on recorded quantitative and qualitative data;
f) sources of error inherent in experimental design are identified and discussed;
g) validity of data is determined;
h) chemicals and equipment are used in a safe manner;
i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions;
j) research utilizes scientific literature;
k) differentiation is made between a scientific hypothesis, theory, and law;
l) alternative scientific explanations and models are recognized and analyzed; and
m) current applications of biological concepts are used.

BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include

a) interactions within and among populations including carrying capacities, limiting factors, and growth curves;
b) nutrient cycling with energy flow through ecosystems;
c) succession patterns in ecosystems;
d) the effects of natural events and human activities on ecosystems; and
e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems.
Essential Questions:

1. What are native species?
2. What has been introduced?
3. What role do the protozoa play in the wetland?
4. What birds are migratory vs. year round residents?
5. What amphibians and reptiles are present?
6. What mammals use the wetland area for habitat?
7. What is the importance of the wetland?
8. What fungi play a role in decomposition?
9. Are all wetlands the same?
10. How does this wetland effect the quality of our drinking water?

Student Role-Youth Voice:

The development of this guide will require the students to take on leadership roles, while the teacher guides and facilitates the project to ensure progress and learning is being accomplished. The students will take on the following roles:

- Researcher
- Photographer
- Artist
- Manual Labor
- Teacher/Mentor

Community Connections:

By making this guide, students will be meeting a community need. Many people use the trail at Sugar Hollow through the wetland for exercise and recreation but many do not know of the benefits that wetlands provide to the environment; or the diversity of flora and fauna in which they are walking through.

Students will address this need by:
- mapping the wetland area
- researching, producing and printing QR codes with valid website links
- developing an interpretative guide
- building a kiosk to hold instructions for use of the QR codes as well as printed guides for those without Smart-Phones

Skills and Habits of Mind:

Students will gain many academic and life skills through this project. These will include but are not limited to:
- learning to use field guides
- learning to use dichotomous keys
- learning to be a good steward of the environment
- understanding the ecology of a wetland
- learning practical use of technology; GPS, Smart Phone technology, QR codes
- learning to develop and interpret maps

Service Project:

Students will develop printed interpretative guides as well as a QR code based guide, establish signage, and build and maintain a kiosk.
Partnerships & Benefits:

We will seek partnerships from the following local organization:

- Bristol Parks and Recreation
- Bristol Bird Club
- John S. Battle Agriculture and Horticulture departments
- Alpha Natural Resources
- Retired Biology Teachers and Professors
- Local Hiking Clubs
- The Nature Conservancy

Resources:

The students will be able to use the following resources for research, development, and implementation of their guides:

- Science textbooks
- Peterson Field Guides
- Dichotomous Keys
- GPS Units
- Park Maps
- Leave No Trace Activity Guides
- QR codes
- Smart Phone Technology

Models and Examples:

The students will study and review interpretative guides, trail maps, QR code links and websites, quest activities, and kiosks from other local parks, and by researching on the internet to learn what is essential to the project’s success. By getting students out on the local trails at Sugar Hollow Wetlands area, we hope this will lead to a love of nature and spur curiosity on other trails such as the Appalachian Trail.

Final Celebration:

The final celebration will be the placement of the QR codes, signage, the printing of the guide and the placement of the kiosk. We hope to accomplish these goals by Earth Day. We will submit a write-up to the local newspaper and also have a booth at Damascus' Trail Days event to publicize the guide and inform the public about how to use it.

Evaluation of the Unit:

The project will be evaluated by feedback from the public and feedback from the students.