Instructional Design Rationale

The purpose of this project is to create a constructivist learning website for 9th grade biology students. The design of this website is driven by the need to enable students to acquire science content knowledge and reasoning/problem solving strategies. It is an attempt to create learning environment that encourages the transfer of knowledge as well as the consideration of multiple perspectives during problem solving. We use the Open Learning Environment (OLE) framework as designed by Hannafin, Land & Oliver (1999) to create a website that will meet our purpose: students’ understanding.

In this unit, for example, students will be exposed to a realistic and ill-structured problem, such as designing a cost-effective and environmentally friendly plan for conserving a threatened species. During the problem solving process, students will acquire both science content knowledge as defined in the 2006 Massachusetts Science and Technology/Engineering curriculum framework and other process goals. It is also our intention that this website be used as a supplement along with other classroom instruction, so that more effective collaboration during the learning process among students occurs. The learning website will serve the following goals:

Content goals

1. Students will understand key factors that influence the population size in an ecological system
2. Students will understand that the relationships among organisms (predation, parasitism, competition, commensalism, mutualism) add to the complexity of biological communities.
3. Students will apply the knowledge of ecology to design a plan for conserving a selected threatened species.

Procedural goals

1. Students will develop problem solving skills, divergent thinking, team working skills, and inquiry thinking.
Open Learning Environments (OLEs)

Students in this project will be required to adapt to the Open Learning Environments (OLE) (Hannifin, Land, & Oliver, 1999) instructional design method. The OLE classroom environment refers to the processes wherein the intents and purposes of the individual are uniquely established and pursued (open-ended learning). This method is expected to expose macro- and micro-level conceptualizations and abstractions of the world around us. We expect students to discover how damaged ecosystems are possibly brought about as a consequence of man’s intervention. Another challenge that students may come in contact with is inquiring about known or unknown forces affecting the balance of nature in remote areas of the planet.

By embracing this task, students will begin to understand and appreciate how individuals within a group setting learn to research, collect, analyze and disseminate for discussion various aspects of why gorillas in the Cross River ecosystem are becoming extinct. By engaging each other (and to a lesser extent themselves), students judge the “what”, “when” and “how” learning is occurring. “Cultivating cognitive process is often more critical than generating products” (Hannifin, Land, and Oliver, 1999).

Most important to the learning process is how wide open the environment can be to students. The OLE is designed to support higher order cognitive skills such as identifying and manipulating variables, interpreting data, hypothesizing and experimenting in ways not available in other design methods. Our expectations, once students have completed this project, is to understand the “what”, “when”, “why” and “how” the Cross River Gorilla is falling into extinction (i.e., a long- or short-term happenstance?). Did this happen as a result of the gorillas’ lack of reproduction (inept biological mating)? Did human intervention contribute to their extinction (global
warming, deforestation, destruction of the localized ecosystem to replace it with another species)? This is just a prelude to what is forthcoming for student discovery. We are determined to advance scientific inquiry more than the mere acquisition of today’s scientific truths.

This project promotes understanding to be more vital to learning than knowing. We expect the students to immerse themselves in experiences that foster an understanding through the many processes of discovery.

**Rationale for choosing Open Learning Environments**

The OLE process invites students to understand and practice an idea rather than being told to memorize facts, as well as to focus on solving an ill-conceived (or ill-structured) problem by developing skills in authentic contexts. This will afford many opportunities for discovery and theory building. Below is a table of the major components of OLEs:

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Table 1: components of OLEs

*Components of OLEs that are involved in the Cross River Gorilla Project*

The components of OLEs that we chose began with the enabling content. The content for the project must be externally imposed, meaning that students will be
presented with an ill-structured problem that will lead them to the exploration of many different ideas about the balance of nature. This enabling context will also require students to consider multiple perspectives.

Because of the externally imposed enabling context, the resources that will be used will be static and asynchronous. Students will look up existing information in books, magazines and on the Internet to find facts about the Cross River Gorillas, their ecosystem, and geography. Students will continue using static resources to develop their plans to help the Cross River Gorillas.

Students will use a variety of tools to find a solution for the Cross River Gorilla’s near extinction. They will begin the project by using the processing tools: seeking, collecting, organizing, integrating and generating. They will identify their resources: the Internet, books, articles, etc. They will use these resources to collect a lot of information about the species, the environment, various environmental issues, as well as many other factors that could be leading to the severe decline of the gorilla. Next, students will need to process and organize this information to form hypotheses based on the facts they have learned. Finally, students will need to generate a plan of action to help the Cross River Gorillas become a more prosperous species, and will use the rubric that is given to self assess their final product.

**Providing conceptual and procedural scaffolding through an educational website**

An educational website will be provided to students at the beginning of the Cross River Gorilla project. This website will contain both procedural and conceptual scaffolding for students, and will serve as a guide throughout the project.
Conceptual Scaffolding

Hannafin, Land and Oliver (1999) state that “conceptual scaffolding is provided when the problem under study is defined, that is, for externally imposed or induced enabling contexts…conceptual scaffolding can be designed to help learners reason through complex or fuzzy problems…hints can guide the learner to available resources…conceptual scaffolding guides learners in regarding what to consider.” The website will do exactly that: guide learners to resources available to them on the Internet, in the school library, or in documentaries. It will provide them with questions such as, “How is the Cross River Gorilla related to the larger ecosystem?” or “What environmental factors may be contributing to the Cross River Gorilla’s decline?” Hints will be included on the website, which will give students some background information in the form of key terms to use in Internet searches.

The website will also outline the steps that students will need to take to progress through the project, but will not provide the “best” resources for students. Hannafin, Land, and Oliver (1999) advise against this. “Conceptual scaffolding provides problem-relevant perspectives related to the concepts under study, not explicit direction as to which resources are considered best” (Hannafin, et al. 1999). Therefore, students will be guided by an outline of the project, but will not be given the answers via the website.

Procedural Scaffolding

Because there is such a large focus on using resources, procedural scaffolding is extremely important to this project because it “emphasizes how to utilize available resources and tools” (Hannafin, et al. 1999). Students will need to find the answers to the problem, but will be taught how to keep track of the useful resources they find by
keeping a bibliography of written sources or bookmarking Internet pages, for example. Before the project begins, a review on utilizing library resources and conducting Internet searches will be given, and this information will be stored in a “Resources” section of the website, just in case students need to view the information again.

**Massachusetts Standards for Science and Technology/Engineering**

Even though students will be presented with an ill-structured problem, they will be adhering to standards from the 2006 Massachusetts Standards for Science and Technology/Engineering. The crux of the Cross River Gorilla Project is outlined in the description for what high school students should be learning in Biology: “A solid understanding of the processes of life allows students to make scientifically informed decisions related to their health and to the health of the planet” (doe.mass.edu, 2006). Please see the curriculum unit for the specific standards addressed.

**Conclusion**

The Cross River Gorilla project, designed as an Open Learning Environment, will help students move beyond the idea that school is about the memorization of facts. Students will use their new knowledge of the Cross River Gorilla, their ecosystem, and global environmental problems, and apply it to new situations. Even though students may not be living in the same ecosystem as the Cross River Gorilla, learning about habitat conservation and human interest conflicting with animal environments will be applicable to aspects of their own lives.
Works Cited:


Tips for the Facilitator

The Open Learning Environment is just that—an open learning classroom setting. While anchored instruction puts the teacher in control of directing the learning process, OLE does just the opposite. Students are paired off into small groups or individually with an ill-structured problem to research on their own, using whatever resources might at the time be available.

The underlining concept of instructional design is not to promote a step-by-step, rigid lesson plan, but rather to provide teachers with some sound, flexible design principles that have been employed with great success. Remember this is a flexible planning model.

Most importantly, teachers using the OLE model may consider, adapt, use and/or discard certain components as they design lessons for particular students, particular content areas, and particular environments or contexts. Each craftily designed lesson adds value to a students’ educational value.

Here are some things to remember:
1. Try not to tell your learners what to do, show them what to do, or let them show you how they did it.
2. Buddy-guided practice, as well as teacher-guided practice, includes discussions and various well-structured cooperative activities, which are proven characteristics of knowledge development and oral language development.
3. When students are engaged in an OLE practice, you might want to monitor their efforts, circulate around the room, provide feedback and individual (or group) assistance when necessary.
4. It’s also important to note that students should know that they’re merely practicing an activity, and not being tested.
5. A well-stated research objective must describe some sort of observable behavior or action that students will execute.

In the end, teachers should not lose sight of modeling as one of the most important and efficient instructional strategy in their repertoire! Equally so, this model should also embrace student information gathering, adjusting the pace of a classroom, repeat explanation, adjusting of methodology, providing more modeling when necessary and help clarifying any student misconceptions.