The Balance of Nature: Single-Celled Organisms

A local manufacturing company has been dumping hazardous chemicals at a holding tank at its facility in your town for many years. Recently, chemicals have begun to leach into the ground causing some of the single-celled organism populations in the area to diminish significantly. The EPA has asked that students in the area do some preliminary research on the long-term effects of the extinction of these organisms. Your team must choose a single celled organism and determine what will happen to the local ecosystem if remedial measures are unable to restore the population to its former levels. Your hypermedia report must include: An in depth description of the organism you have chosen; an explanation of the role the organism plays in nature; a prediction of the effect of the elimination of this organism on the local environment; and a way of compensating the environment if the organism is rendered extinct.

	Novice	Apprentice	Practitioner	Expert
Organism	diagram is not clearly labeled; a few labels are links to further relevant information on particular components	clearly labeled diagram of organism; most major components labeled; some labels are links to further relevant information on particular components	clearly labeled diagram of organism; all major components labeled; most labels are links to further relevant information on particular components	clearly labeled diagram of organism; all major components labeled; all labels are links to further relevant information on particular components
Role in Nature	research lacks proper documentation; role of organism is explained in few appropriate ecosystems and food chains	carefully researched and documented information explains role of organism in some appropriate ecosystems and food chains	carefully researched and documented information explains role of organism in most appropriate ecosystems and food chains	carefully researched and documented information explains role of organism in all appropriate ecosystems and food chains
Predictions	argument is not persuasive; research is not used to support argument	persuasive argument supported by some research; prediction based partly on logical extension of information used	persuasive argument supported by research; prediction based on logical extension of information used	persuasive argument supported by research; prediction based on logical extension of information used; considers opposing or conflicting points of view
Plan for Supplanting Loss of the Organism	somewhat feasible; requires high level of expense / effort	feasible; requires a high level of expense / effort	feasible and based on realistic considerations	feasible and based on realistic considerations; can be carried out with minimal expense / effort

Learning Focus

conducting research on a local organism; exploring the organism's interrelation with its environment

Grade Level

grades 6 - 9

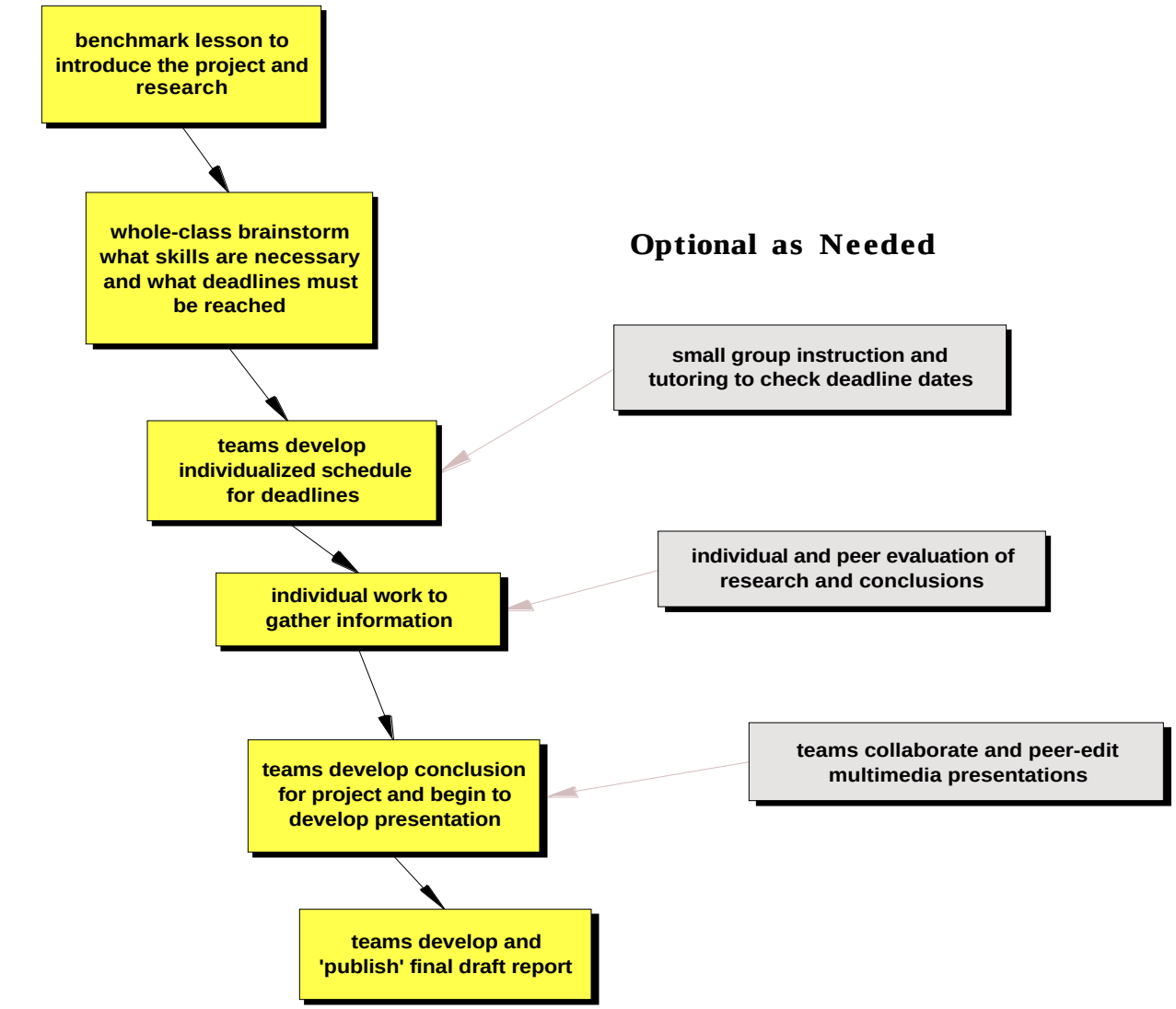
Essential Learnings

- identifying regional one-celled organisms
- researching the organisms' effect on their immediate environment
- extrapolating the effect of the organisms' extinction
- developing a persuasive multi-media presentation
- using the Scientific Method to do research

Participatory Structures

This activity requires an abundance of research. It lends itself, therefore, to pairs or small group (triplet) work. More than three students in a group could prove to be counter-productive. The flow of the task might look like this:

General Flow of Task



Technology Infusion

Internet to research one-celled creatures
multimedia software to develop presentation
mind-mapping software to graphically develop the organism's relationship with the environment

Timeframes

Given a 45-minute period, this task might take a week or two to complete. Alternatively, it could be used to open a unit of study, allowing students to work on it over the course of a month, interspersed with other assignments. It could be used as an interdisciplinary project in the areas of science and language arts.

Classroom Management

You might distribute a weekly schedule to your students with times blocked out for your whole-class or small group lessons. Then, you could allow your groups to develop their own schedule of deadlines to finish the task. If you do this, it is possible that you would want to check all teams' deadline schedules before they begin the task.

Instructional Notes

You might want to begin this task by giving a whole-class benchmark lesson on one-celled organisms and their connection to their environment, both in the food chain and otherwise. Following that, you might want to distribute or assign each group an organism to research. If it is at all possible, you might take the class to an area near the school where you could collect samples of the organism and have students record observations about their environment. You might further have the class brainstorm what skills and deadlines might be necessary for this task to be completed. As students work, you will need to facilitate learning, both from a content perspective and from a process perspective. Possible facilitation questions:

Comprehension	What is endangering the organism you are studying?
Application	Have we done anything to contribute to the extinction of this organism?
Connection	What can you do to reduce the threat to this organism?
Synthesis	How will the extinction of this organism ultimately affect us? What does it tell us that there are increasing species of organisms on the brink of extinction?
Metacognition	How did you go about your research? How might you do it better next time?

Assessment

If this task is used as an introduction to the included skills, then assessment would take the form of determining and helping the students determine where they are on the rubric and offering the kinds of learning opportunities to help students move to the practitioner and expert columns. If this task is more of an evaluative tool used after students have conducted several research assignments, then a point system could be created using the rows and columns of the rubric. Additionally, if you are looking to evaluate mastery of skills, you should individually test students after the completion of the task.

Resources

- a list of single-celled organisms located in the area
- books, journal articles, and pictures of single-celled organisms
- microscope with slides of single-celled organisms
- information from the EPA
- Internet access for research
- multimedia software for creation of the final presentation

How-to Sheets

Step-by-step direction sheets may be useful in providing students with more learning independence in the following areas:

- identifying and classifying single-cell organisms
- creating multi-media presentations
- writing mechanics checklist