

Current Applications in Science

Strand	Scientific Investigation
Topic	Conducting and presenting research on recent scientific ideas, discoveries, or technologies
Primary SOL	BIO.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which j) research utilizes scientific literature; m) current applications of biological concepts are used.

Background Information

So many new and innovative ideas and technologies appear all the time that it would take an army of people to keep up with them. In this lesson, each student will pick a “new” scientific idea, discovery, or technology of genuine interest to him/her, research it, and present what is learned in a format of his/her choosing. Students will base their investigations on scientific literature published within the last ten years, evaluating resources to determine their credibility.

When presented with new content and concepts, students often seek some relevance to their own lives. This lesson affords students an opportunity to steer their own learning by researching topics of interest to them and building their presentation skills in ways they choose.

This lesson should not be rushed. It is better for students to take the time necessary to learn and practice the processes of doing research properly and communicating their research effectively than to rush through the lesson just to get it done. Many students at this level are intimidated by research and writing because they are not yet experienced with and confident about how to conduct research, document resources, or formally present the information. It is best to begin with a review of these procedures. If you find that students are not on the right track as they work, use that as a teachable moment to build their skills and confidence.

Materials

- Research Checklist (attached)
- Internet access
- Recent scientific literature

Vocabulary

APA format, credible source, MLA format, scientific journal

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Prepare for this lesson by doing some research of your own to create a list of recent discoveries or technologies from which students can choose if they are unable to find appropriate ones on their own. A good source for ideas is *Discover* magazine’s “Top 100 Stories in Science” for the current year, which can be searched on the magazine’s Web site <http://discovermagazine.com/>.

1. Brainstorm with students what the term “scientific literature” means. Share examples of scientific literature, and demonstrate how to find scientific literature resources on the

Internet and in the school library. Discuss how to decide whether such a resource is credible or not.

2. Ask students to think about “new” scientific ideas, discoveries, or technologies they might be interested in researching—things that really interest them. Have them consider any scientific news they might have read or seen recently. If necessary, provide them with a list of choices. Have each student narrow down the choices to two or three possibilities.
3. Discuss how to reference information. Ask students to think about what they might need to record in order for someone else to find that information source later. Introduce APA or MLA format. Distribute copies of the attached Research Checklist for students to use to gather complete information during notetaking. Equate research to a quest (for information) that must be thoroughly documented.
4. Supervise students as they begin their research, giving them benchmarks and plentiful support. The most important moment is the first one. Students who are empowered to find resources and are able to do so quickly and easily will be more likely to continue the research because they will be excited about their discoveries. On the contrary, students who do not find information early in the process may become frustrated and unmotivated. How long you give students to complete their research is dependent upon the abilities of students, the number of resources available, and the topics chosen. If you give students several weeks to complete their research outside of class, be sure to check in with them regularly. Schedule “peer review” days in which students bounce ideas off one another, or have students submit “evidence of progress” along the way. Things to check for include the following:
 - Variety of sources: Do they include scientific literature and other credible sources?
 - Quantity of information: Is there enough to cover the topic?
 - Quality of information: Is it valid? Is it relevant to the original topic?
 - Complete reference information: Does it cover everything that is needed?
5. Allow students to choose the form of their final product—e.g., an oral presentation, a poster, an electronic slide presentation. All students should present their information to the class to practice their communication skills, but the formats of the presentations should be flexible to accommodate different learning styles and abilities.
6. Optional: In place of several classes devoted to many presentations, have one or two students present at each class over the course of several weeks. Students can sign up on a calendar or draw for dates. Invite other teachers and/or administrators to attend these presentations, and encourage students to dress to impress and rehearse their presentations.
7. Optional: Have students compile their research into written magazine articles, which you publish in a class magazine. Ask students from other classes to read and comment on one or more articles throughout the year.

Assessment

- **Questions**
 - Why is it imperative to reference your sources in a universally accepted way?
 - Why are skills such as communication, problem solving, and teamwork important in biology class? Why are they important in the real world?

- **Journal/Writing Prompts**
 - Throughout this research project, chronicle in a journal what is easy, what is hard, any questions you might have, and any advice you would give to someone completing this assignment in the future.
- **Other**
 - As students present, have the audience fill out a comment sheet.

Extensions and Connections (for all students)

- Require students to base their research on articles that outline scientific experiments. For each article, have them analyze the experimental design, identifying the independent variable, dependent variable, control, constants, hypothesis, observations, and conclusions. Challenge students to describe future experiments that could be done, based on the article.

Strategies for Differentiation

- Provide the scientific literature to students, and have more than one student use the same document but analyze the document independently. In this way, peer reviews can be more detailed and constructive.
- Encourage students to research current scientific events in their home countries.
- To help students document and organize their researched information, provide each student with a stack of index cards and a manilla folder with six envelopes glued inside. Direct students to write the reference information for each of six sources on an envelope and to number the envelopes 1–6. Tell them to record information from these six sources on index cards, number each card with the number of its source envelope, and then store each card in its source envelope.

Research Checklist

Title of Article or Web Page:

Author:

Year:

Journal Name, Volume, Issue, Pages:

Date of Access:

Web Address:

Keywords Searched to Find Source:

Information Found: