

Craig Hoover

GUIDED PRACTICE

Class: Bio 1220L: Foundations of Biology: Evolution, Ecology and Biodiversity Lab

Date assigned: The class meeting one week before the in-class lesson.

Time estimated to complete this assignment: ~~90~~-120-180 minutes

Overview/Introduction

What is this lesson about? Why do we care?

A literature search is an essential step in the creation of knowledge. Peer-reviewed scientific literature is used to synthesize the elements of good science; the prediction, unknown and importance. This will make your work interesting to other people.

Learning Objectives

Basic objectives

List 3-5 learning objectives that you expect students to be able to master on their own before class.

List the variables that will be tested after reading a document that explains a procedure for a hypothesis-driven scientific study.

Locate peer-reviewed scientific literature that tested similar variables.

Summarize the result of a peer-reviewed source that tested similar variables to ~~the a~~ given experimental procedure and note relevant differences between the two studies.

Advanced objectives

List 3-5 learning objectives that you expect students to need help mastering.

From a pooled group of summaries and abstracts, classify sources based on their relevance to the given experimental procedure.

Check the results of relevant peer-reviewed scientific literature for consistency.

Predict the result of a given procedure based on a literature search.

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Preparatory Activities and Resources:

1. Give detailed, action-oriented instructions for completing the Guided Practice assignment. Keep in mind that the activities should be minimal, simple, engaging, productive, and failure tolerant (see Talbert, 2017, pg. 135).

Download the preparatory worksheet, rubric and lab handout (provided as supplements).

Read the rubric that explains how your finished paper will be graded. Make an outline of the elements and organization of a hypothesis-driven scientific study on your preparatory worksheet.

Read the Soil Invertebrate Diversity formal lab handout. Underline or highlight the variables of the study while reading it and make note of whether each variable is an independent variable, dependent variable or a third variable that is held constant in the present study but may differ among a group of studies. When finished reading, write the variables on your preparatory worksheet. Next to each variable list a few synonyms and ~~atonyms~~antonyms. Then write the scientific question that the study is asking.

Use the variables as keywords in a search of an appropriate engine such as googlescholar or oneseach to locate potentially relevant peer-reviewed scientific literature. Read the titles and abstracts of at least 5 sources. Choose 2 sources that tested the same variables as the present study and download the full studies. Cite the studies on your worksheet. Skim the studies and for each note the specific variables tested and the result on the worksheet. Also make note of any relevant differences between the studies on your worksheet.

2. Give a “playlist” of resources such as readings, videos, audio, or other content delivery methods that provide students the content to work with.

Preparatory worksheet

Rubric

Soil Invertebrate Diversity formal lab handout

See [thesaurus.com](https://www.thesaurus.com) for help with synonyms and antonyms of variables that can be used as keywords to locate relevant peer-reviewed scientific literature.

See scholar.google.com for a search engine that can locate peer-reviewed scientific literature.

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See www.cpp.edu/~library/index.shtml for another search engine that can locate peer-reviewed scientific literature.

Exercises: Please complete by the day before class meets at 11:59 pm by submitting work to the link on the “assignments” tab of the class Blackboard website.

- Give a method for students to submit their work online BEFORE the face to face class meeting. Google forms, SurveyMonkey, and tools in your LMS will all work. Alternatively, give them instructions on what completed work to bring to class as an entry ticket.
- The submitted work should demonstrate students’ mastery of the basic learning objectives.

Questions?

Give a way for students to get help.

For help with questions try contacting your lab partner (the person you traded phone numbers with at the start of the semester) or send me an email.

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ADVANCED PRACTICE

Class: Bio 1220L: Foundations of Biology: Evolution, Ecology and Biodiversity Lab

Date assigned: The class meeting of the in-class lesson.

Time estimated to complete this assignment: 4-6 hours

Overview/Introduction

What is this lesson about? Why do we care?

A literature search is an essential step in the creation of knowledge. Peer-reviewed scientific literature is used to synthesize the elements of good science; the prediction, unknown and importance. This will make your work interesting to other people.

Learning Objectives

Advanced objectives

List 3-4 learning objectives that you expect students to need help mastering in class and after class.

Synthesize the results of available scientific literature to identify what is known and create an unknown relative to a specific scientific question. ~~Create an unknown.~~

Explain the importance of the subject.

Write a complete introduction to a scientific paper.

Activities & deliverables

- Consult the lab handout, rubric and template to write an introduction to the formal paper. This introduction will be graded and returned to you using the criteria explained in the rubric. You will then have the opportunity to use the peer review process to improve-rewrite your introduction, before submission of the final draft of your paper, but that is another lesson...

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Flipped IN-CLASS Lesson Plan Template

Subject: topic

The subject is a formal scientific paper.

The topic is a literature search.

Basic objectives for preparatory work:

By the completion of this exercise students will be able to:

- **list** variables tested in a given scientific procedure
- **recognize** peer-reviewed scientific literature that tested variables similar to a given procedure
- **summarize** both similarities and differences between a given procedure and scientific literature

Advanced objectives for classwork:

By the completion of this exercise students will be able to:

- **classify** sources from scientific literature based on their relevance to a given procedure
- **check** the results of relevant peer-reviewed scientific literature for consistency
- **predict** the result of a given procedure based on a literature search

	Time planned	Activity and rationale	Resources needed
Beginning of period	20 mins	<p><i>Activity: Form groups of 4. Discuss with your group the variables of all eight sources while comparing them to the soil invertebrate diversity study. Construct a graphic (such as a tree) that communicates the relations among the studies.</i></p> <p><i>Rationale: The classification activity in a group setting is an opportunity for recall and response. Students provide each other with helpful information and select the most relevant sources.</i></p>	<p>Completed guided practice worksheet</p> <p>Copies of abstracts of 2 sources of primary scientific literature that studied variables similar to the variables that will be studied in the soil invertebrate diversity experiment</p>
Middle of period	20 mins	<p><i>Activity: On the whiteboard the instructor writes the scientific question from the current study and draws a table. Column 1 is the citation, column 2 is if the difference among treatments is significant or not and column 3 is which state of the independent variable was associated with the highest diversity. Students fill in the table with information from their sources.</i></p> <p><i>Rationale: This activity clarifies the common elements of a result and summarizes a collection of studies in preparation for building a prediction.</i></p>	<p>Whiteboard</p> <p>Students' laptop computers with downloaded versions of the articles</p>
End of period	10 mins	<p><i>Activity: Class discussion about the unknown, prediction and purpose of a scientific study. Ask students if there is another reason to cite literature. What about the subject and importance of a study?</i></p> <p><i>Rationale: The unknown is a creative element of a scientific study. It is omitted or non-explicit by most students at the 1000 level. This lesson is designed to help students take the steps necessary to appreciate the originality of their work.</i></p>	<p>None</p>

Commented [CH1]: Students will be new to the concept of a significant result. The instructor should skim papers with each group and help students determine if the result of each study is significant or not. This should help prevent students from just drawing conclusions from the means in the literature and will help students identify the results of studies from the literature.

Commented [CH2]: It may help to write a schematic; treatment A < treatment B < treatment C...

Commented [CH3]: It may be helpful to ask students if there is a reason to read the full studies.

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Flipped AFTER CLASS Work Plan Template

Advanced learning objective	Activity and rationale	Instructions to students
<p>By the completion of this exercise students will be able to use the results of a literature search to write an introduction to a formal scientific paper.</p>	<p>Activity: <u>Students write an introduction that will be graded and revised using the peer review process.</u></p> <p>Rationale: <u>Students will learn to identify the elements of a complete introduction and will demonstrate information literacy. Students perform the procedure and write a formal scientific paper.</u></p>	<p>Consult the rubric and the template to write a formal paper <u>an introduction to your formal paper</u>. You will be graded on completeness, organization, content and style.</p>