



# Directed Scientific Writing: Reinforcing Scientific Literacy Through the Laboratory Report Process

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## Abstract

Scientific literacy is a fundamental competency for students in undergraduate biology courses, where students gain the ability to understand the scientific process and to communicate science to others. The generation of a laboratory report reinforces scientific literacy when students effectively: 1) procure relevant peer-reviewed literature and properly cite, 2) formulate a hypothesis based on previous research in the field, 3) interpret data and format results, and 4) evaluate the connection of the data to previously published work. To achieve this goal, separation of the lab report into a series of smaller assignments directed students through the expectations for the Introduction, Methods, Results, and Conclusions of the lab report. The lab report was further broken into paragraph-specific content to promote professional scientific writing. The series of assignments were assigned sequentially throughout the semester. Students received feedback before moving on to the next segment. This process allowed students more time to reflect upon and refine their assignment based on the feedback before the final submission of the report. The directed content assignments and the feedback process generated improved skills in understanding the process of scientific research, reading comprehension of scientific literature, and effectively and professionally communicating findings.

## Potential Timeline

Week	Assignment	Feedback
2	Journal Article Identification Worksheet	Did the student use proper reference formatting?
4	Introduction Section	Did the student use peer reviewed publications with proper citations, and formulate a hypothesis?
5	Methods Section	Did the student have through yet succinct descriptions of protocols used?
6	Results Section	Did the student correctly format tables and figures and generate a narrative results section?
7	Discussion Section	Did the student evaluate the data in relation to previously published work?
10	Final Lab Report	Submit for grade after reflecting on feedback given.

## Assignments

*Goal:* Procure and properly cite relevant peer reviewed literature

*Assignment:* Journal Article Identification Worksheet

*Student learning:* Literature search to identify references, practice with citation formatting.

*Goal:* Formulate a hypothesis based on previous research in the field

*Assignment:* Introduction Section

*Student learning:* Generate an introduction segregated into specific paragraphs that introduce the big picture, discuss relevant peer reviewed literature, and clearly state the hypothesis.

*Goal:* Accurately interpret data.

*Assignment:* Discussion Section

*Student learning:* : Generate a discussion section that combines the meaning of the results with the content of the introduction that is segregated into specific paragraphs in reverse order of the introduction section.

*Goal:* Describe the experimental process that was done.

*Assignment:* Methods Section

*Student learning:* Accurate and succinct description of the protocols and methods that were used during the experimental process.

*Goal:* Accurately display data.

*Assignment:* Results Section

*Student learning:* Generate a results section that contains a narrative and a graphical section that describes the data collected and highlights the mathematical analysis of that data.

*Goal:* Format graphs and tables accurately.

*Assignment:* Formatting tables and figures worksheet

*Student learning:* Ability to display data that is easy to interpret and include thorough labeling of figures and tables with informative titles, axis labels and figure legends.

