

The Science Writing Heuristic

If you ask your classmates and even your professors for the definition of inquiry, you will probably get as many unique definitions as the people you ask. Inquiry takes on different meanings for different people. In this lab manual, we focus on inquiry as the means for performing science. In order to have you think through the processes of science, we use headings and structure based on the Science Writing Heuristic (SWH).

SWH is a well-developed approach to guided inquiry experiences, and it is designed to encourage construction of conceptual knowledge. It is also based on relationships among questions, evidence, and claims. The traditional Science Writing Heuristic includes the following categories for students to process:

1. Beginning Questions—What are my questions?
2. Tests—What did I do?
3. Observations—What did I see?
4. Claims—What can I claim?
5. Evidence—How do I know? Why am I making these claims?
6. Reading—How do my ideas compare with other ideas?
7. Reflection—How have my ideas changed?
8. Writing—What is the best explanation that clarifies what I have learned?

We have adapted these categories for you into the headings below that you will see in each investigation.

Asking Questions

Scientific investigations usually begin with a question to be answered by gathering data and experimenting. Sometimes this question will be provided, while other times you will be asked to develop the question with your laboratory partners or classmates.

Preparing to Investigate

Before beginning experiments, it is important to clearly outline a procedure for gathering evidence that includes identifying the data to be collected and the steps to be followed. In some cases, a complete or partial procedure will be included in the investigation, but many times you will devise part or all of the procedure with your laboratory partners or classmates. Whether the procedure is provided or devised, you will need to study it completely before beginning. You will also need to create a system—usually a data table—for recording the observations and measurements you will make during the investigation.

Making Predictions

In some investigations, you will predict what you think will happen as you gather evidence. These predictions should be based on your prior experience and will not be evaluated for correctness, but you may be asked to reflect upon them after the investigation.

Gathering Evidence

The core of an investigation is gathering evidence. It contains directions, steps, or guidance for collecting data and observations.

Analyzing Evidence

The data gathered (evidence) in some investigations requires further processing before the initial question can be answered. Guidance is often provided to facilitate calculations or other analysis.

Interpreting Evidence

After analyzing evidence, you should ask, “What does the evidence mean?” Answering this question allows you to propose explanations for scientific phenomena. Questions within this section are designed to help you think about implications of the evidence and connect it to the purpose of the investigation.

Making Claims

Once data have been analyzed and interpreted, an answer to the initial question can be proposed. This answer often comes in the form of a scientific claim. Such claims must be supported by evidence from the investigation.

Reflecting on the Investigation

The final task in most investigations is to reflect on what was done, think about how your understanding has developed, and apply what was determined to other situations.

We hope these categories will assist you as you work through these investigations as well as help you think like a scientist.

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Source: Greenbowe, T.J.; Hand, B. Introduction to the Science Writing Heuristic. *Chemists' Guide to Effective Teaching*, First edition; Pienta, N.J., Cooper, M.M., Greenbowe, T.J., eds. Prentice Hall, 2005.