

# **Power Writing Model and the Art of Scientific Conclusions**

**Writing in Science**

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## I. Power Writing and The Art of Scientific Conclusions

Writing scientific conclusions for laboratory investigations has always been one of the more challenging tasks for science students to do and for science teachers to grade. The objective of the Power Writing Model is to challenge students to write quality reports and enhance inquiry in science through writing.

The Power Writing Model *Conclusion* answers seven basic questions that serve as a model for students to improve their performance in the “Florida Writes” test. Practicing with the Power Writing Model will develop students’ writing abilities and improve their achievement level.

### **Power Writing Vocabulary correlated to Scientific Writing**

**Introduction:** what you will prove and how you will prove it. A problem statement combined with a working hypothesis/trial solution.

**Thesis statement:** the single point of the entire essay (Problem to be solved).

**Topic Sentence:** the single point of a paragraph (In science the topic sentence varies with respect to the introductory, middle, and concluding paragraphs).

**General Statement:** one way to prove the topic sentence is true (supported or not supported). This is a general statement that is supported or not supported by the data collected and that will answer one of the seven questions that must be addressed when writing scientific conclusions.

**Evidence:** portion of investigation that addressed each question to be answered in a conclusion. It will be in the form of data collected which has been analyzed and interpreted to determine the findings which will or will not support the hypothesis that has been tested.

**Commentary:** opinion (inference or inferences made based on the data collected).

**Concluding Sentence:** one statement that is true (supported or not supported) for all the proof in the paragraph. Opinion (inference).

**Concluding Paragraph:** Statements that are true (supported or not supported) for all the proof in the entire essay. Opinion (inferences).

**Organization:** all essays and all paragraphs have a beginning, a middle, and an end. All scientific conclusions answer the seven basic questions that must be addressed when conducting complete scientific investigations.

## II. Components of Experimental Design

Title:	An Experimental Diagram summarizes the problem statement, hypothesis, manipulated variable(s), responding variable(s), constant variables, number of tests and trials, and the control.
Type of Experiment	Describe the design of the experiment as a Descriptive, a Comparative, or an Experimental type of experiment.
Problem Statement	A problem statement is a question about possible relationships between manipulated and responding variables in a situation that implies something to do or try.
Hypothesis	A hypothesis is the investigator's prediction of a possible specific relationship between a manipulated variable (cause) and a responding variable (effect) that provides a testable answer to the problem.
Independent (Manipulated) Variable	Manipulated variables are the factors that can be changed by the investigator (causes). Manipulated variables are also called the independent variables.
Dependent (Responding) Variable	Responding variables are the observable factors of an investigation the result or happen (effects) when a manipulated variable is changed by the investigator. Responding variables are also be called the dependent variables.
Variables Held Constant	Constant variables are the other identified manipulated variables in the situation that are kept or remain the same during the investigation.
Experimental Tests	Apply the experimental procedure to a specific aspect of the manipulated variable.
Control Test	A control test is the separate experiment that serves as the standard for comparison to identify experimental effects, changes of the responding variable resulting from changes made on the manipulated variable.
Number of Trials per Test	The trials are the number of experimental repetitions, objects, or organisms tested during each test of a manipulated variable.

## 1. Components of Experimental Design

Title	
Type of Experiment	
Problem Statement	
Hypothesis	
Independent (Manipulated) Variable	
Dependent (Responding) Variable	
Variables Held Constant	
Experimental Tests	
Control Test	
Number of Trials per Test	

### III. Power Writing Model in Science

#### 1. Introductory Paragraph:

State the purpose of the experiment, what was set out to prove, and explain the reasoning behind the experiment. This is where the problem statement and the hypothesis are introduced. The problem statement introduces the problem you are trying to solve and the hypothesis describes the solution that you hope to obtain after the experimentation. (***This section answers question 1: “What was investigated?”***). Continue by providing relevant information supporting or not supporting the hypothesis (***This section answers question 2: “Was the hypothesis supported or not supported by the data?”***). This is how the rest of the sentences in the introductory paragraph are linked. They will describe the data that was collected and the major findings of the investigation (**question 3**) that supported or did not support the hypothesis as the solution to the restated problem.

#### 2. Body Paragraphs:

The body paragraphs support the introductory paragraph by elaborating on the different pieces of information that were collected as data that either supported or did not support the original hypothesis. Using terms such as “as a matter of fact” or “for example” and “not only but also” for successive sentences is useful. Each finding needs its own sentence and relates back to supporting or not supporting the hypothesis. The body paragraphs may include **Question 4**, which describes how the findings compared with other researchers or groups investigating the same problem. The number of body paragraphs you have will depend on how many different types of data were collected. They will always refer back to the findings in the first paragraph. The concluding sentence can begin with a term such as “clearly” which would be followed by the statement that is true (support or non support) for the entire paragraph as it relates to the hypothesis. The commentary can include some inferences (opinions) although the major inferences should be reserved for the concluding paragraph.

#### 3. Concluding Paragraph:

The concluding paragraph contains the major commentary about the problem statement and the hypothesis in the first paragraph of the conclusion. This is where **question 5, what possible explanations can you offer for your findings?** can be answered. The paragraph should also include answers to **questions 6 and 7 that include what recommendations do you have for further study and for improving the experiment and some possible applications of the experiment?** At the end of the paragraph the problem statement and hypothesis (introduction and thesis) is restated more specifically with an abbreviated version of the explanation of the findings to summarize the conclusion.

#### 4. Questions and Examples:

Questions	Examples
1. What was investigated? (Describe the problem statement)	The relationship between the age of compost used in soil and the growth, health, and quality of the leaves of tomato plants were investigated.
2. Was the hypothesis supported by the data?	The data appears to support the hypothesis that the growth, health, and leaf quality of tomato plants would improve increasing the age of compost mixed with soil.
3. What were the major findings?	As the age of the compost increased the health, quality of the leaves, and the mean height of the tomato plants increased. The mean height of plants grown in soil with compost aged for six months was greater than the control group, with plants exhibiting similar health. More plants grown in soil with one month-old compost exhibited poor leaf quality than in the control.
4. How did your findings compare with other researchers?	No similar studies were found relating the age of compost to the growth of tomato plants.
5. What possible explanations can you offer for your findings?	As the compost decomposes, nutrients needed by the plant may be released thereby improving the growth of the plant.
6. What recommendations do you have for further study and for improving the experiment?	This experiment could be repeated with an increased number different ages of compost. Measurements of soil temperature may help to understand what is happening to the compost.
7. What are some possible applications of the experiment?	The use of compost aged for longer than six months will improve the growth of tomato plants.

#### IV. Laboratory Report Writing Form (Template)

**Title**

**FSSS** (Strands, Standards, Benchmarks): \_\_\_\_\_

\_\_\_\_\_

**Science Concept** (s): (Background information) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Problem Statement:** (Can be written as a question) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Hypothesis** (es): (explanation to the Problem statement – should be written as an IF – THEN – BECAUSE statement) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Procedures:** (as many as needed)

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

**Variables:** \_\_\_\_\_

\_\_\_\_\_

**Independent (Manipulated) Variable:** (if not comparative or observational investigation) \_\_\_\_\_

\_\_\_\_\_

**Dependent (Responding) Variable:** \_\_\_\_\_

\_\_\_\_\_



