Instructor’s Manual

# **Chapter 1: Introduction to Scientific Thinking**

Chapter Outline

1.1 Science as a Method of Knowing

1.2 The Scientific Method

* 1. Other Methods of Knowing
  2. The Goals of Science
  3. Approaches in Acquiring Knowledge
  4. Distinguishing Science From Pseudoscience

Chapter Summary Organized by Learning Objectives

Key Terms

End-of-Chapter Problems

Review Questions

Activities

**Learning Objectives**

After reading this chapter, you should be able to:

1. Define science and the scientific method.

2. Describe six steps for engaging in the scientific method.

3. Describe five nonscientific methods of acquiring knowledge.

4. Identify the four goals of science.

5. Distinguish between basic and applied research.

6. Distinguish between quantitative and qualitative research.

7. Delineate science from pseudoscience.

* A suggestion for meeting learning objectives. This book has been written as a teachable reference. You will find that the sections and chapters in this book are loaded with practical research examples and illustrations that can be easily incorporated into your lectures. An advantage of teaching from content in the textbook is that it will increase how often students reference and read the textbook. So incorporating the many examples and illustrations from the textbook into your lectures should have a positive effect on the readings many students complete. This is just something to keep in mind as you prepare your lectures.

**Lecture suggestions in support of the learning objectives**

Learning Objective 1 suggestions: Refer to Section 1.1 for this learning objective. Science is often taught as a method of knowing completely separate from the typical nonscientific ways of knowing, also taught in this chapter. However, this approach can mislead students into think that may types of thought can lead to ideas that are tested in science. For example, almost any hypothesis must have some rationale, which is an application of the use of rationalism. Of course, the rationalized hypothesis will be subjected to the scientific process, which is how we ensure that only the more accurate hypotheses arise from the ideas we test.

In this chapter, I begin with an introduction to the scientific method. By starting with the scientific method, you can then show how each of the nonscientific ways of knowing are used to help develop ideas and hypotheses, yet also explain how the scientific method is used with it to ensure that only the more accurate hypotheses arise from the ideas we test.

Learning Objective 2 suggestions: Section 1.2 is a great reference for meeting this learning objective. This section works students through the general research process. The six steps of the scientific method are given in Figure 1.1. This figure will be used throughout the book to open chapters and help students follow the organization of the book. The book is organized in order of this process, although ethics is covered in all chapters, and not only in Chapter 3. It can be helpful to ask students to memorize this figure now so that they begin to anticipate the research process, as it is introduced in the book and throughout your course.

Research design this early in the semester tends to be intimidating to students. You may consider drawing a simple analogy to a game. In class, explain to students that board games have many pieces and to play the game you have to follow the rules for how to use the game pieces on the board. In a similar way, the rules for engaging in science are written in research design. Once data have been obtained scientifically, we can then apply statistical analyses to describe and interpret the data we collected. This analogy generally works well with students.

Learning Objective 3 suggestion: Section 1.3 is a great reference for meeting this learning objective. This section works students through the nonscientific ways of knowing. To support this learning objective, you can use the **Name the Method of Knowing** exercise included in this manual. In this exercise, students must match a variety of scenarios with the appropriate method of knowing that is applied in the example. This exercise is a useful way to students to apply the methods of knowing to useful examples, and not simply memorize definitions.

Learning Objective 4 suggestions: Section 1.4 is a great reference for meeting this learning objective. This section gives four general goals leading to an understanding of control—that is, the ability to control to elicit and stop an behavior or event form occurring. While these goals are broadly defined, they can help students gain an appreciation for the intent of engaging in the science of behavior.

Learning Objective 5 suggestions: Section 1.5 is a great reference for meeting this learning objective. This section distinguishes between basic and applied research. Using the examples given in the chapter can be helpful to distinguish between these two types of research.

Learning Objective 6 suggestions: Section 1.5 is a great reference for meeting this learning objective. This section distinguishes between quantitative and qualitative research. Using the examples given in the chapter can be helpful to distinguish between these two types of research.

Learning Objective 7 suggestions: Section 1.6 is a great reference for meeting this learning objective. This section focuses on what pseudoscience is and what it is not, then goes on to distinguish it from science. Using the examples given in the chapter can be helpful to delineate science form pseudoscience.

**Name the Method of Knowing**

Match the appropriate method of knowing with each of the following examples. For this problem: A = tenacity, B = intuition, C = authority, D = rationalism, and E = empiricism.

\_\_\_\_ 1. You close up the store at exactly midnight because that’s when the store always closes.

\_\_\_\_ 2. A teacher states that students do not care about being in school because they are not paying attention in class.

\_\_\_\_ 3. Your mother locks all the alcohol in the house because she has a feeling you may throw a party while she’s at work.

\_\_\_\_ 4. You believe that if you don’t read your textbook you will fail your research methods class because your professor said so.

\_\_\_\_ 5. You choose to buy a particular car because you saw other customers with that car who appeared very satisfied.

\_\_\_\_ 6. You take off your hat indoors because that is what you have always done when you go inside.

\_\_\_\_ 7. A professor states that students fail his exams because they must not be studying for his exams.

\_\_\_\_ 8. You study your notes before a class because you have a feeling that the professor is going to give a surprise quiz in class.

\_\_\_\_ 9. You buckle up every time you drive because it’s the law.

\_\_\_\_ 10. A friend chooses to order a dessert because he saw other patrons enjoying that dessert at another table.

Answers to the Name the Method of Knowing exercise:

1. A

2. D

3. B

4. C

5. E

6. A

7. D

8. B

9. C

10. E