Chapter 1
Using Levels of Inquiry in the Classroom

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EXECUTIVE SUMMARY

The development of major concepts in a science classroom is explored through the instructional framework of varying the level of student inquiry. An exploration experience, interactive demonstration, discovery experiment, and application challenge serve as this framework for increasing the level in which the students ask questions, devise methods to answer these questions, and develop answers to the questions. Instructional technology tools such as classroom response systems, Google Docs, the use of blogs, and WebAssign are integrated into the inquiry experience to support the learning process. This inquiry model shifts the locus of control from the teacher to the student, as the student's familiarity with new concepts deepens.

INTRODUCTION

If you are a teacher of science, you and your colleagues may have grappled with the level of inquiry that you build into your classrooms. You may have heard a colleague say, "If I present an activity with 'cookbook' type directions, I am not fostering the inquiry that I desire in my students. On the other hand, if I leave an activity open-ended, my students either flounder with a lack of direction or head down a path that does not necessarily lead to the construction of ideas that are the goal of my instruction." You may have even heard these words in your own head.

DOI: 10.4018/978-1-4666-0068-3.ch001

Perhaps you have also wrestled with the question, "Should all laboratory experiences in my classroom be designed with the same level of student inquiry?" These two questions, which are central to our inquiry teaching philosophy, lead us to the purpose of this chapter. Using varying levels of inquiry in the classroom is not only sound pedagogy, it is necessary to help students become scientifically literate while exploring the world in ways that resemble how scientists work.

In this chapter we will explore the idea of using varying levels of inquiry in a thoughtful and planned manner as we introduce students to a single big idea through a week-long set of inquiry experiences. The use of instructional technology tools such as classroom response systems, Google Docs, the use of blogs, and WebAssign are integrated to support the learning process. Although the context of many of the examples used is a high school physics classroom, I have seen many of these ideas applied to biology, physical science, chemistry, and engineering classrooms at various levels. To that end, the chapter will conclude with an example from another discipline and a challenge for the reader to consider what such a model might look like in his or her own classroom.

WHAT DOES INQUIRY LOOK LIKE?

To begin our level of inquiry discussion, let's evaluate the familiar Chinese proverb:

I hear…I forget; I see…I remember; I do…I understand.

Few can argue against the idea that a student's retention level is a function of both the level of student engagement and the number of learning modalities that are present in the learning experience (Archer, 2011). However, while hands-on experiences are valuable, there is a danger in accepting the third statement in the above proverb unless we clarify what is being done and how it is being done (Wheeler, 2000). Understanding *may* come as a result of doing, but it may not. Perhaps you have experienced students doing something in the laboratory that led not to a clarity of understanding, but to frustration and a sense for some students that, "Science is not my thing." When my own students have told me, "I learn it better when you just tell us or show us," I know that 'doing' does not always lead to understanding.

In the same sense, 'doing' does not necessarily equal inquiry. As an example, consider a class following a prescribed set of instructions:

1. Determine the mass of an empty graduated cylinder.
2. Pour 50 mL of water into the graduated cylinder.
3. Determine the mass of the graduated cylinder with the water inside.

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