

LINKING THE LEVEL OF INQUIRY (GUIDED VERSUS OPEN) TO LEARNING OBJECTIVES

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Learning objectives in K-16 science education range from gaining an understanding of scientific concepts (content) to developing critical thinking skills necessary to do science (process). Inquiry is commonly cited as an effective means of obtaining these learning objectives. However, inquiry based activities encompass a broad spectrum ranging from guided inquiry (instructor directed) to open inquiry (student directed) and it is important to link the type of inquiry to the desired learning outcome. At the guided inquiry end of the spectrum, the instructor states the problem, formulates the hypothesis, and develops a working plan and the student performs the activity, gathers the data, and draws conclusions. This is the most common type of exercise we give our students and is typical of most of the exercises found in published lab manuals. It is very effective in conveying content because the instructor is able to lead the student into discovering a specific concept. Students state the problem, formulate the hypothesis, and develop their own working plan with open inquiry. Open inquiry is ineffective for teaching specific content because the content will depend on the aspect of the problem that the student chooses to investigate. However, it is very effective in developing scientific process skills. Examples guided and open inquiry, college level field exercises will be presented to illustrate these differences. Guided and open inquiry exercises present different types of material, content rich versus process rich. Students need to experience a balanced mix of guided inquiry and open inquiry activities in order to increase their understanding of scientific concepts and develop their critical thinking skills.