



Our question for today is why does Daniella's plant at the bottom is yellow and so

Plant	observation	DCM
1	The plant is growing more leaves	6cm
2	the plant from number two is died.	DCM
3	The plant I looked at it and it already shaking	
4	The plant is growing and its leaves	

Scaffolding Science Inquiry Through Lesson Design

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Using a Research-Based Template to Plan Classroom Instruction

1



The current national and state focus on standards, assessment, and accountability due to the No Child Left Behind legislation challenges most classroom teachers to utilize instructional planning instruments and lesson design models that provide standard specific instruction and to gather evidence of student proficiency through both student work and testing. Instructional programs emphasizing inquiry are often criticized for being too open ended. The critics of this approach feel that inquiry often lacks a well-defined alignment to specific content standards and does not provide a reliable means of assessment.

As a result of states adopting science content standards to meet federal mandates, it has become an increasing challenge for schools

and classroom teachers to develop complex scientific reasoning abilities among the students rather than just a recitation of science facts. To have a real understanding or to be able to make real meaning of the big ideas in science, students need to be able to extend their ability to explain these concepts and their relationship to big ideas in science in their own words and based upon their own experiences. Using an alignment model or a lesson design model to plan guided inquiry that addresses both the need for content understanding and the development of complex scientific reasoning abilities will provide classroom teachers with the structure necessary to accomplish this task.

The designers of the Valle Imperial Project in Science (VIPS) model recognized that development of complex scientific reasoning takes time and that to be effective every science unit should be embedded with a lesson design that addresses the development of science concepts and thinking skills. This thinking was consistent with the recommendations from the National Research Council (1999, 2005). The structure of the VIPS lesson design model and classroom instruction focuses on maximizing student opportunity to develop complex scientific reasoning. The ability of students to actually make meaning or understand the goals of what the intended lesson was trying to achieve are essential to student learning.

The goal of every classroom teacher should be for students to make meaning and develop deep science conceptual and procedural understanding from classroom science experiences. Often this goal is difficult to achieve due to a disconnect between what should be taught, what actually *is* taught, and what students learn in the design of classroom instruction (Marzano 2003). These breakdowns in curriculum alignment and student learning may be a function of poor lesson design and planning or from teachers' "leap of faith" that the science curriculum materials that they use are aligned.

The research-based components of the VIPS lesson design provide teachers with a planning structure and provide practical suggestions to support student success. Research on how students learn science indicates that the development of deep conceptual understanding in science requires time and can be enhanced through providing supports, scaffolds, and prompts that guide students to enhance their scientific reasoning abilities (National Research Council 2005). Thus, classroom teachers must guide the inquiry process in order to develop,

in their students, both deep conceptual understanding and the reasoning ability to formulate explanations based upon evidence.

The lesson design model VIPS developed uses a scaffolded guided inquiry approach for lesson planning. Using this approach, classroom teachers can address the need to systematically focus on a sequential set of instructional units all aligned to state content standards over several years to develop practice on the part of students in the use of the scaffolds through a consistent instructional approach. This approach provides classroom teachers with a lesson design that guides inquiry using scaffolds that are designed to place the focus of instruction on the actual intended curriculum through the implemented curriculum and attain the development of student understanding of the science content described within the standards and the development of complex reasoning abilities, such as analyzing and interpreting data or formulating claims from evidence collected during an investigation.

A planning model for scaffolded guided inquiry is a valuable structure for the alignment of the three critical elements of lesson planning—intended, implemented, and achieved curricula. By using a consistent approach to lesson planning and implementation, students are provided with *sameness* or consistency. Because students need to generate their own meaning regarding the science content being learned, the psychological principle of sameness is important. Marzano (2003) states that sameness is critical to the process of learning. When students are presented with processes that are similar through the consistent exposure to writing and discussion scaffolds or prompts, students learn how to do inquiry and develop the ability to make evidence-based explanations from their science investigations. This requires that teachers plan the learning experiences for children with careful thought. These learning experiences also need to be sequenced over several units and years because students need time and practice to learn how to do inquiry. It is therefore important for teachers to have the support of a lesson design model that is based on student success and carefully crafts an alignment between the intended curriculum, the implemented curriculum, and the achieved curriculum and is consistent in its approach to scaffolding.

Figure 1–1 depicts the lesson design model and the built-in scaffolds for guided inquiry that aligns the intended, implemented, and achieved curricula. Each of the three components of this model are introduced next and are discussed in subsequent parts of this book.

Figure 1–1 Aligned Planning Model

