The Learning Cycle:
What the Teacher Does

Stage	Consistent with Learning Cycle Strategy	Inconsistent with the LC strategy
Exploration	• Creates interest • Generates curiosity • Raises questions • Elicits responses that uncover what the students know or think about the concept/topic • Encourages the students to work together without direct instruction from the teacher • Observes and listens to the students as they interact • Asks probing questions to redirect students' investigations, when necessary • Provides time for students to puzzle through problems • Acts as a consultant to students	• Explains concepts • Provides definitions and answers • States conclusions • Provides closure • Lectures • Provides answers • Tells or explains how to work through the problem • Provides closure • Tells the students that they are wrong • Gives information or facts that solve the problem • Leads students step-by-step to a solution
Invention	• Encourages students to explain concepts and definitions in their own words • Asks for justification (evidence) and clarification from students • Formally provides definitions, explanations, and new labels • Uses students' previous experience as the basis for explaining concepts	• Accepts explanations that have no justification • Neglects to solicit students' explanations • Introduces unrelated concepts or skills
Expansion	• Expects students to use formal labels definition, and explanations provided previously • Encourages students to apply or extend concepts and skills in new situations • Reminds students of alternative explanations • Refers students to existing data and evidence and asks: "What do you already know? Why do you think. . .?" (Strategies from the previous stage apply here also.) • Looks for evidence that the students have changed their thinking or behavior • Asks open-minded questions, such as "Why do you think…? What evidence do you have? What do you think about x? How would you explain x?"	• Provides definitive answers • Tells students that they are wrong • Lectures • Leads students step-by-step to a solution • Explains how to work through the problem.

The Learning Cycle:
What the Student Does

Stage	Consistent with the Learning Cycle Strategy	Inconsistent with the LC Strategy
Exploration	• Asks questions such as "Why did this happen? What do I already know about this? • Shows interest in the topic • Thinks freely, but within the limits of the activity • Tests new predictions and hypotheses • Forms new predictions and hypotheses • Tries alternatives and discusses them with others • Records observations and ideas • Suspends judgment	• Asks for the "right" answer • Offers the "right" answer • Insists on answers or explanations • Seeks one solution • Lets others do the thinking and exploring • Works quietly with little or no interaction with others (only appropriate when exploring ideas or feelings) • "Plays around" indiscriminately with no goal in mind • Stops with one solution
Invention	• Explains possible solutions or answers to others • Listens critically to others' explanations • Questions others' explanations • Listens to and tries to comprehend explanations offered by the teacher • Refers to previous activities • Uses recorded observations in explanations	• Proposes explanations from "thin air" with no relationship to previous experiences • Brings up irrelevant experiences and examples • Accepts explanations without justification • Does not attend to other plausible explanations
Expansion	• Applies new labels, definitions, explanations, skills in new, but similar, situations • Uses pervious information to ask questions, propose solutions, make decisions, design experiments • Draws reasonable conclusions from evidence • Records observations and explanations • Checks for understanding among peers • Demonstrates and understanding or knowledge of the concept of skill • Asks related questions that encourage future investigations	• "Plays around" with no goal in mind • Ignores previous information or evidence • Draws conclusions from "thin air" • Uses in discussions only those labels provided by the teacher

The Learning Cycle Model:
Learning Science and Technology

Learning Activities for Science	Stages	Supporting Activities With Technology
Observe the natural world Ask questions about the natural world State possible hypothesis Engage in focused play Look for information Observe specific phenomena Collect and organize data Select appropriate resources Design and conduct experiments Engage in debate Define parameters of an investigation	**Exploration**	Observe the world made by humans Recognize a human problem Identify possible solutions Brainstorm possible alternatives Experiment with materials Design a model Employ problem-solving strategies Discuss solutions with others Evaluate choices Identify risks and consequences Analyze data
	Invention	
Communicate information and ideas Construct a new explanation Evaluation by peers Determine appropriate closure		*Construct and explain a model* Constructively review a solution Express multiple answers/ solutions Integrate a solution with existing knowledge and experiences
	Expansion	
Apply knowledge and skills Share information and ideas Ask new question		Make decisions Transfer knowledge and skills Develop products and promote ideas