

# Quick Reference Tools for Strategies 4 and 5

## An addendum to the STeLLA Strategies Booklet

### Relationships between Strategies 4 and 5

	Focus	What Scientists and Students Do
Observation	What you can see	Look at, listen to, or otherwise sense a phenomenon.
Analysis and Interpretation (Strategy 4)	Patterns in observable data	Organize data, clarify key observations, look for patterns in data, identify what needs to be explained.
Explanation (Strategy 5)	Unseen mechanisms that might explain observed patterns	Combine evidence, logical thinking, and science ideas/theories to explain observed patterns.
Argument (Strategy 5)	Competing explanations of what is observed	Analyze and critique competing explanations and the methods used to develop them.

### Tools to Help Students Construct Scientific Explanations

**Explanation** = evidence + logical reasoning + science ideas

#### CERA framework for constructing explanations and arguments:

1. **Claim:** A statement that answers the investigation question
2. **Evidence:** Scientific data that support the claim
3. **Reasoning:** A justification using science ideas/theories to explain why the evidence (data) supports the claim
4. **Alternatives:** Evidence and science ideas used to support or challenge alternative explanations (argumentation)

**Note:** The CERA framework is used primarily in the classroom as a tool for teaching students how to develop scientific explanations and arguments (STeLLA strategy 5). However, teachers also use this framework for videocase-based lesson analysis of their science teaching in RESPeCT study groups throughout the school year.