How to Improve Inquiry and Discourse in Science Lessons

Dr. Beth Lewis
Associate Professor, Department of Teaching, Learning, & Teacher Education
University of Nebraska-Lincoln

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Session Overview

Goals
1. Reflect upon your current teaching practices.
2. Provide research-based resources for teaching and learning science.

Activity
1. Designed to improve science lessons with rich oral and written discourse strategies.
2. With repeated use and practice the model can develop cutting-edge teaching practices.
Communication in Science Inquiry Project

was originally a

National Science Foundation-funded grant
for teacher professional development

To establish
scientific classroom discourse communities
What is a *Scientific Classroom Discourse Community (SCDC)*?

1. As an individual, on your handout, define a scientific classroom discourse community.
   - What are teachers doing?
   - What are students doing?
   - How is a SCDC different from other discourses?
     - **Don’t answer #3, yet**

2. Turn to the person nearest to you and briefly share your ideas.
Key Aspects of a SCDC

Teachers learn about specific instructional strategies to build a **scientific classroom discourse community**

- **Scientific inquiry** and communication in science
- **Oral** and **written discourse** are situated within scientific inquiry
- **Academic language development** supports the learning of science
- **Learning principles** from *How People Learn* (NRC, 2000)
A Scientific Classroom Discourse Community

Nature of Science Communication

Learning Principles
- Talking
- Discourse
- Writing
- Prior Understandings
- Metacognitive Monitoring
- Performance Expectations

Learning

Inquiry Environment
- Formative Assessment / Feedback
- Knowledge and Conceptual Frameworks
- Academic Language Development
Classroom Observation Instrument: DiISC

- “Discourse in Inquiry Science Classrooms” (DiISC)
  - Developed over 3 years to be aligned with CISIP
- Has 5 scales with 36 items total:
  - Inquiry (6)
  - Oral discourse (5)
  - Written discourse (6)
  - Academic language development (8)
  - Learning principles (11)
- Each item scored using a 0 – 3 point rubric
- Adapted for use for designing science lessons
## DiISC Example Items: Scientific Inquiry

### 2. Teacher engages students in asking scientific questions for the purpose of investigation (hands-on or other means)

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<tr>
<th>Observed:</th>
<th>0</th>
<th>1</th>
<th>2</th>
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**Teacher provides students opportunities to:**
- a) formulate questions about the natural world
- b) present explanations for questions
- c) distinguish between scientific and non-scientific questions

**Rubric:**
- 0 = teacher generates question or no investigation
- 1 = limited opportunity; rote “cookbook” activity
- 2 = students directed to form scientific questions to be investigated
- 3 = students form and explain reasoning behind the scientific questions for their investigation

### 3. Opportunities for students to design and plan exploration of the natural world individually or in groups

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**Teacher provides opportunities and guidance to:**
- a) plan and conduct scientific investigations individually
- b) plan and conduct scientific investigations in groups
- c) justify procedures before carrying out investigations

**Rubric:**
- 0 = no activity or activity has a set procedure
- 1 = students are all expected to design the same procedure
- 2 = students design a procedure but are not required to justify
- 3 = students design, plan, and justify their approach to exploration of a topic
Mini-Professional Development

1. Return to your prior knowledge handout and review your responses.

2. From the five categories of the CISIP model, read each teaching strategy card you received:
   
   **Yellow** = Inquiry 
   
   **Blue** = Oral discourse 
   
   **Green** = Written discourse 
   
   **Pink** = Academic language development 
   
   **Purple** = Learning principles
Example of a Redesigned Lesson on the Water Cycle
Mini-Professional Development (con’t)

3. Think of a lesson/unit you recently taught.
4. Revise the lesson using the 5 strategies you were given.
5. Share your ideas with the person next to you.
6. Return to your worksheet and identify any changes to your ideas about a SCDC (#1).
7. Now, answer #3 on your handout:
   • How could you build a SCDC with your students?
   • What would your priorities be?
Activity article available at:

http://digitalcommons.unl.edu/teachlearnfacpub/151/

…contact me for color handouts if you would like them

Dr. Beth Lewis
Associate Professor, Department of Teaching, Learning, & Teacher Education
University of Nebraska-Lincoln

ELewis3@UNL.edu