Rationale

To have bona fide inquiry experiences, students must formulate their own questions, create hypotheses, and design investigations that test the hypotheses and answer the questions proposed. Published materials are generally too structured to provide the necessary freedom for students to engage in these important inquiry skills. However, to meet the expectations of the science standards, students need an opportunity to do self-directed inquiry learning that takes their curiosity and interest into account.

What does inquiry look like in the context of design?

Students:
• Generate a question or problem to be solved based on their needs.
• Decide on a course of action, define and carry out the procedures of an investigation.
• Collect, organize, and display data using observation and instrumentation.
• Use the data collected to make sense of their experience (frame an explanation or conclusion) based on evidence and accepted scientific theories.
• Revise their designs to probe more deeply with investigation, construct generalizations
• Communicate the processes and results to others through student presentations.
What does instruction look like in the context of design based learning?

- Challenges
  - Knowing how to link instruction and design
  - Unclear when to “tell”
  - Different from traditional methods
  - Time-consuming
  - Classroom configuration
Strategies That Inform Instruction in DBL

• Careful system decomposition

• Constrain materials to situate instruction for student learning

• Facilitate instruction to advance student learning
Strategies

• System decomposition
  – Subsystems (systems thinking) allow you to focus on one aspect
  – Not trivial but if done with a lot of thought provides a framework for coherent learning
Alarm System Decomposition

Subsystems included:

• Power Subsystem
  – Battery

• Indicator Subsystem
  – Light bulb, LED, buzzer

• Detector Subsystem
  – Photocell, thermistor
Task

Task: Design a circuit that will turn on a light.
Task 2: Design a circuit that will make your bulb as bright.
Constraining materials to situate instruction for student learning

- know concept(s) the subsystem addresses
- choose materials carefully (sneaky)
  - to force students to bump up against concepts
  - give numerous degrees of freedom for students to explore in their designs
Facilitating instruction to advance student learning

• Telling
  – When?
  – What?
  – How?
• Teacher Moves