

Safety in Science

You should always be very careful when you do a science activity or experiment. This page tells you some things to remember when you do science.

- Listen to your teacher's directions and instructions.
- Read the activity carefully before you begin.
- Never taste or smell anything, unless your teacher tells you to.
- Protect your eyes and hands with goggles and gloves.
- Handle all sharp objects and science equipment carefully.
- Keep your work place neat and clean.
- Clean up spills right away.
- Tell your teacher if you have an accident or see something that might not be safe.
- Wash your hands carefully after doing a science activity.

Materials List

Aluminum foil*
Battery "C"*
Battery holder
Bolt (4")
Bulb holders
Bulbs
Chalk*
Colored paper*

Copper switch
Felt
Glass Marble*
Metal spoon*
Nail*
Paper clips*
Plastic combs
Plastic spoon*

Ruler*
Salt*
Straw*
String*
White paper*
Wire
Yarn

* = Materials not contained in the kit

Flip4Science™

Electricity

Building the Scaffolding for Inquiry

Directed Inquiry • Guided Inquiry • Full Inquiry

Teacher's Guide

**Dr. Karen Ostlund, Ph.D.
and Dr. Tim Cooney, Ed.D.**



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How to Use Flip4Science

Flip4Science™: Electricity is an exciting new way to help your students understand and practice hands-on science.

Flip4Science: Electricity uses the latest research on scaffolded inquiry and scientific processes to ensure that your students are being prepared for high-stakes science tests mandated by No Child Left Behind.

Teacher's Guide

The Teacher's Guide for *Flip4Science: Electricity* provides all the teaching support that you need to make this program successful. Each of the six lessons includes:

- National Science Education Standards (NSES) addressed in the lesson
- Student Objectives
- Explore Activity
- Teacher Background
- Vocabulary Development
- Common Misconceptions
- Real World Connections

Also included for the teacher and the student are:

- Procedures for setting up center activities
- Procedures for completing Directed and Guided Inquiry activities
- Student recording sheets for Directed and Guided Inquiry activities
- Full Inquiry options and recording sheets

Center Book

The *Flip4Science: Electricity Center Book* is a full-color set of activities for students. This book can be used by small groups or the whole class. The Center Book includes the following:

- Student procedures for completing Directed Inquiry activities (one per lesson)
- Student procedures for completing Guided Inquiry activities (one per lesson)
- Full Inquiry options (one per unit)

Science Journal

A set of five Science Journals come in the kit for students to record and share their science observations. The Science Journal features left-hand pages that are half-blank for drawing and half-lined for writing, and right-hand pages with a 1 cm grid for creating charts, graphs and diagrams. This is a great tool for students to express their ideas and for teachers to assess students' understanding of important concepts.

Manipulatives

Included in the *Flip4Science: Electricity* kit are many manipulatives that you will need to complete each Directed and Guided Inquiry activity. Items that can be easily obtained from home or school are not included in the kit. A complete materials list is provided for you in the inside front cover of this book.

What Is Scaffolded Inquiry? by Karen Ostlund Ph.D.

Just as scaffolding provides the structure and support needed to construct a building, Scaffolded Inquiry provides essential support as students construct the skills and knowledge needed to build science literacy.

As students progress through the stages of inquiry, the support provided by the teacher diminishes, and student ownership of the investigative process increases. This developmental process is essential for students to reach the ultimate goal of conducting science investigations independently—engaging in Full Inquiry.

Directed Inquiry

- The beginning stage, **Directed Inquiry**, is teacher- or materials-directed. It provides a structured model of the inquiry process. Without this type of support and guidance, students cannot progress to asking and answering scientific questions independently (Cody, 1998).
- Directed Inquiry introduces students to the essential features of inquiry, and helps students reflect on the characteristics of the processes in which they are engaged.
- Directed Inquiry provides the foundation upon which subsequent stages of inquiry are built. This instruction is designed to provide students with the experiences necessary to learn and practice the processes of inquiry.

Guided Inquiry

- In the second stage, **Guided Inquiry**, the teacher moves from the role of director

to facilitator. Students continue to refine their inquiry skills based on the foundation developed during the Directed Inquiry explorations.

- During Guided Inquiry, students have the opportunity to practice skills of inquiry with greater independence. Students are encouraged to think about variables, and they learn to plan for all the variables that may affect the outcome of an investigation.
- Guided Inquiry focuses student attention on learning particular science concepts. Students build science literacy and improve confidence in their abilities to do inquiry.

Full Inquiry

- **Full Inquiry** is one of the ultimate goals of science literacy. To conduct full inquiry, students must be able to apply the skills and knowledge developed in the previous stages of the Continuum of Inquiry.
- According to the National Research Council (2000), Full Inquiry takes place if the following essential features of inquiry are present.
 - Questions are scientifically oriented
 - Learners use evidence to evaluate explanations
 - The explanations answer the questions
 - Alternative explanations are compared and evaluated
 - Explanations are communicated and justified