

# Meet the Book and DVD

## Summary

These activities will help students learn how to read and comprehend science text.

## Materials

- *Dr. Art's Guide to Science: Connecting Atoms, Galaxies, and Everything in Between*
- *Dr. Art Does Science*
- [Who Knows What?](#)
- [Levels of Knowledge](#)
- [Guiding Questions](#)
- Wooden stand with cow magnet
- Steel paper clip
- Thread
- Transparent and masking tape
- Flat objects made of different materials (e.g., plastic ruler, wood ruler, index card, metal butter knife, plastic butter knife)
- D-cell battery
- 20 gauge stranded wire with insulation stripped
- Four ceramic disc magnets
- Two blank overhead transparency sheets
- Three rubber bands
- 60 meters of #30 magnet wire
- Two mini alligator clips
- Light-emitting diode (LED)

## Additional Resources

### Books

- *Dr. Art's Guide to Science: Connecting Atoms, Galaxies, and Everything in Between*  
, by Art Sussman; ISBN 0-7879-8326-8
- *Square Wheels and Other Easy-To-Build, Hands-On Science Activities*  
, by Don Rathjern and Paul Doherty; ISBN 0-943451-55-8
- *Teaching Reading in Science*  
, by Mary Lee Barton and Deborah L. Jordan, ISBN 1-893476-03-0

### Videos

- *Dr. Art Does Science*  
, by Art Sussman (WestEd, 415-615-3144, [www.WestEd.org](http://www.WestEd.org)); MS-06-02

## Background for Teachers

For any science topic to be taught, accomplished teachers have acquired pedagogical content knowledge. They know the science content at a deeper level than basic understanding of the standards and objectives. For example, students learn that electricity and magnetism share some common features (e.g., attraction and repulsion), whereas teachers should know that electricity and magnetism are both part of the same force, called electromagnetism. One important feature of electromagnetism is that when wires and magnets move relative to each other, this motion causes electricity to flow in the wires. High voltage electricity is produced in power stations in exactly this way.

Perhaps one of the biggest ideas of science is that all of science works together to explain reality.

Deep pedagogical content knowledge also includes an ability to recognize the big ideas associated with a topic, and to make meaningful connections across different topics and fields of science. The more students experience the connections in science, the greater the likelihood that they will understand, remember, and enjoy what they have been taught.

Teachers also understand the difficulties that students experience in mastering the science content, and they use a variety of tools to effectively explain the content in ways that match the needs of different students. This pedagogical content knowledge also includes skills in increasing students' abilities to learn when they read science texts. At a basic level, this generally involves assigning literacy strategies for students to use before, during, and/or after they read. At a more advanced level, this involves fostering metacognition, helping students to become aware of what is going on in their minds as they read and try to make sense of a text. Successful readers monitor their understanding, become aware of difficulties they may be having, and seamlessly apply literacy strategies to comprehend what they are reading.

### Intended Learning Outcomes

#### 1. Understand Science Concepts and Principles

### Instructional Procedures

#### Invitation to Learn

What should you know when you have symptoms of a disease? What should a doctor know about your symptoms?

#### Instructional Procedures

Invitation to learn ("Who Knows What?" and "Levels of Knowledge") leads into discussion of different levels of knowledge by students, teachers, citizens, and experts.

Working in groups, explore different sections of *Dr. Art's Guide to Science: Connecting Atoms, Galaxies, and Everything in Between*.

Discuss issues related to different levels of understanding the associated standards, and to effectively teaching these standards.

Make a shaker-generator to take back to the classroom.

### Extensions

#### Curriculum Extensions/Adaptations/Integration

Read the book *Dr. Art's Guide to Science*, and note Big Ideas and connections that enrich your understanding and that can inform your teaching of the Grade 5 Core Curriculum. Distinguish between material appropriate for teachers and that for Grade 5 students.

Watch the DVD *Dr. Art Does Science*, and note experimentation and content ideas that can inform your teaching of the Grade 5 Core Curriculum. Distinguish between material appropriate for teachers and that for Grade 5 students.

Ask students to become aware of their thoughts as they read a challenging, interesting science text that includes graphic elements. Have them take notes about their thoughts, and about any strategies (what they do) as they read to help them understand the text.

#### Family Connections

Provide a challenging and interesting science reading for students to take home and share with family members. Have them ask the family member to jot down notes about their thoughts as they read, and about any strategies (what they do) as they read to help them understand the text. Have the family discuss reading strategies.

Examine a flashlight that works by motion, and discuss what must be happening inside the device.

## Bibliography

Heller, J.I. Daehler, K.R., Shinohara, M., & Kaskowitz, S.R. (April 20, 2004). *Fostering pedagogical content knowledge about electrical circuits through case-based professional development*. Paper presented at the annual meeting of the National Association for Research on Science Teaching, from <http://www.wested.org/cs/we/print/docs/sc/narst.html>

Pedagogical content knowledge refers to understanding what makes the learning of specific topics difficult to learn, and knowledge about ways to make that subject matter comprehensible to learners. This paper focuses on teachers' knowledge of electrical circuits.

Craig, M.T., & Yore, L.D. (1992). Middle school students' metacognitive knowledge about science reading and science text: An interview study. *ERIC Source* (ED356135 ). Retrieved from <http://www.eric.ed.gov>

The simplest definition of "metacognition" is thinking about thinking, and being aware of one's own thinking processes. Many reading strategies ultimately aim at fostering metacognition. Skillful readers effectively utilize metacognition, monitoring and improving their understanding as they read.

## Authors

[Utah LessonPlans](#)