

**Macmillan/McGraw-Hill**

**Science: The Teacher Master Series**

**Video Workshop Facilitator Guide**

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# ***About the Science:*** **The Master Teacher Series Professional Development Program**

**Welcome** to the Macmillan/McGraw-Hill Professional Development program *Science: The Master Teaching Series* Video Workshop Facilitator's Guide. This guide is designed to be used with each of the video modules on the *Science: The Master Teaching Series* DVD. This series was specifically developed for the elementary school science teacher, who will benefit from learning research-based instructional strategies.

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**Contents of This Program** This guide provides the activities and instructions needed to conduct your professional development workshops. The program requires the use of the *Science: The Master Teaching Series* DVD. The program contains four modules:

- Teaching Science: Small Group Activities
- Teaching Science: Whole Group Activities
- Supporting Classroom Management
- Integrating Reading/Language Arts and Science

In each module there are four video segments:

- Author Commentary—A Macmillan/McGraw-Hill science author discusses key concepts and sets the context for viewing an authentic classroom lesson.
- Classroom Lesson—Segments from an authentic classroom lesson are shown to illustrate key concepts and present strategies that teachers can apply in their classrooms.
- Author Analysis—The program author provides thoughtful analysis of the activities and instructional strategies used by the teacher in the classroom lesson.
- Teacher Reflection—The teacher of the classroom lesson reflects on the planning strategies used for the lesson.

Each segment is accompanied by a workshop activity that supports key concepts and encourages teachers to apply concepts to their own teaching practices.

\* \* \*

**Professional Development** The demand for improved performance in all subject areas, including science, is increasing. *Science: The Master Teaching Series* is designed to respond to this demand with a professional development program that features video and workshop activities that foster collaboration and improved instruction using a variety of strategies, including authentic classroom lessons and author commentaries. The professional development activities included in this guide may be used at both the district and school level.

*Science: The Master Teaching Series* is aligned to the National Staff Development Council Standards. The workshop organizes adults into collaborative learning communities and provides the resources needed to conduct each session. Videos provide research-based content from an experienced educator; the model is of instruction in authentic classroom lessons or examples. Through each session, educators deepen their knowledge of research-based instructional strategies.

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## ***About the Science:***

# ***The Master Teacher Series Professional Development Program***

**Implementing Science: *The Master Teaching Series*** This professional development program is flexible enough to be used by educators with varied backgrounds. Administrators may use the program to refresh or develop their own knowledge of research-based instructional practices. For face-to-face sessions, the preferred implementation model is an initial session for leaders and department heads prior to holding teacher sessions at the school level.

*Science: The Master Teaching Series* may be used by small or large districts; however, the size of the district will determine the best option for implementation. The number of educators included in the workshop sessions and the number and location of schools are key factors.

**Small District Implementation** Implementing *Science: The Master Teaching Series* may provide the opportunity for several small districts to meet together in initial sessions for school leaders and science department heads. Bringing smaller districts together to launch professional development will maximize personnel and foster collaboration. Following these sessions, professional development sessions for teachers may be held at individual schools.

**Large District Implementation** District-level training should be held for leaders and department heads to clearly communicate district professional development goals. Depending on the number of district-level participants, area meetings may be desired. Following district meetings, the professional development program may be implemented at local schools by holding weekly department meetings.

**School-Based Sessions** *Science: The Master Teaching Series* provides professional development in an interactive, collaborative environment. Teachers will not only learn from the series video, but they will also discuss ideas, share information, and learn from one another. The interactive learning experience provided through the professional development sessions allow novice and master teachers to share information, experiences, and lesson strategies throughout each session.

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**Workshop Activities** There are four videos included on the DVD. Each video is further divided into segments, as described earlier. Professional development workshop activities are provided for each video segment. Each workshop activity takes approximately 45 to 90 minutes to complete, including the time spent watching the videos. Activities can be completed by a group or as independent study.

**Materials** The program requires the use of the Video Workshop Facilitator Guide and the accompanying DVD.

**Independent Study** Activities used as independent study should be completed in writing, rather than with discussion or collaboration.

***About the Science:***  
***The Master Teacher Series Professional  
Development Program***

**DVD Use** The videos corresponding to all activities are found on the DVD. The DVD is meant to be played on a television or on a computer with DVD movie capabilities. The DVD menu allows participants to navigate to the complete video titles or to individual video segments that correspond to the workshop activities.

\* \* \*

**Study Groups and Action Research**

As a follow-up to each video segment, workshop participants may chose a topic for further study or research. Study groups and action research projects are desirable activities for enriching the professional development experience. Following a video segment, teachers may try out or test one of the new strategies by using the technique in their classroom. Workshop participants can also research a new topic, possibly one presented by the educators or researchers in the video. Study groups are effective ways of collaborating to find out more on any topic.

# Using Science: The Master Teacher Series

## For the Workshop Facilitator

**Workshop Setting** Each workshop is designed to be delivered in a small group setting. This small group format promotes collaboration and the exchange of ideas. Activities are designed to be accomplished within a manageable time frame, providing an excellent opportunity for professional growth within the structure of a regular school day. It is ideal for after-school sessions or department meetings.

**Workshop Activities** The DVD contains authentic classroom models and lessons, commentaries and analyses by guest authors, and teacher interviews. Following each video segment, workshop activities in this facilitator guide engage participants in discussion and analysis of the key instructional strategies demonstrated in the classroom lessons.

**Facilitator's Role** Typically, a facilitator organizes the meetings, manages the setting (e.g., equipment, seating, and handouts), encourages participation on the part of attendees and, as needed, serves as a record keeper for attendance and participation. The program itself provides content for participants to discuss.

**Workshop Planning** Facilitators should read through lesson instructions and activities in advance in order to plan for appropriate seating, to decide if any materials other than those provided in the guide (e.g., chart paper for sharing responses) are desired, and to identify the video associated with each activity.

**Prior to the Workshop** The facilitator should make copies of the workshop activity handouts for all participants and preview the video referenced in the activity description. In some cases, participants will be asked to refer to video lesson materials or student work located in the back of the guide. Facilitators will need to make copies of these materials as well.

**Facilitator Instructions** Detailed instructions for workshop facilitation accompany each activity. The *Facilitation Strategies* that follows each set of activities can be used to supplement facilitator and participant knowledge about key concepts.

**During the Workshop** Because professional interaction is key to the success of the workshop, facilitators should encourage participants to share their ideas and concerns about teaching. Each activity is designed to promote this interaction with help. Facilitators should

- explain the format of the workshops, especially the use of video and activity pages
- encourage participants to discuss and share their ideas, experiences, and knowledge
- explain that much of the success of the workshop sessions depends on participants' collaboration and discussion

**Think and Discuss** Each activity includes a focus question for participants to consider, discuss, and/or write about. Suggestions for using Think and Discuss are included.



**Teaching  
Science:  
Small Group  
Activities**



# Teaching Science: Small Group Activities

## Workshop Focus

One of the ways teachers can integrate science into daily instruction is by using small group instruction. Arranging students into small groups allows teachers to maximize instructional time, improve learning, and motivate students. This professional development workshop will enhance participants' understanding and ability to use small group instruction when teaching science.

## Workshop Preview

This professional development workshop is delivered in segments, most of which are comprised of a video clip and an accompanying activity. The video-based segments include

- Author Commentary—Kathryn Carr-LeRoy, a Macmillan science program author, discusses key concepts and sets the context for viewing the classroom lesson.
- Classroom Lesson—Segments from an authentic classroom lesson illustrate key concepts and strategies participants can use in their classrooms.
- Author Analysis—The program author provides thoughtful analysis of the activities and instructional strategies used by the teacher in the classroom lesson.
- Teacher Reflection—The teacher of the classroom lesson reflects on the planning strategies used for the lesson.

Each video segment is accompanied by an activity. The activities in this program include

- Differentiating Instruction—Develop new ways to meet the needs of a diverse classroom.
- Strategy Focus—Consider new ways to engage and motivate students.
- Station Break—Brainstorm lesson ideas that use learning stations.
- Considerations—Reflect on teachers' current teaching practice.

In addition to the four video-based activities, there is one extension activity—Looking at Student Work—in which participants will analyze student work collected from the classroom lesson.

## Facilitation Strategies

To help you develop knowledge of strategies, the Facilitation Strategies contains useful information to share with participants. In some cases, suggestions are made for stimulating discussion during activities. We recommend that you read through the section that pertains to each activity prior to beginning.

## Materials Used in the Video Classroom

The lesson plan used for the video classroom lesson appears on page X in the Lesson Materials section at the back of this guide. You are encouraged to refer to this plan throughout the chapter as a tool for understanding the context of the video segments.

Lesson worksheets, materials lists, and sample student work are also included to supplement the viewing experience.

## Author Commentary Differentiating Instruction

In this activity, participants will discuss differentiated instruction and brainstorm ways to meet the diverse needs of learners.

### Guide to Viewing

Kathryn Carr-LeRoy discusses the opportunities for using small groups to teach science. While viewing, ask:

- How can teachers integrate science into daily instruction?
- How can small group instruction help meet the needs of a diverse population of students?
- How can teachers use informal assessment in small group instruction?

### Activity Instructions

Share information from the Facilitation Strategies (located in this section following the activities) prior to beginning this activity.

- Share with participants the Guide to Viewing (located on this page).
- Click Teaching Science: Small Group Activities on the DVD main menu.
- Click Author Commentary on the submenu and watch the video segment.
- Discuss as a group the comments Kathryn Carr-LeRoy makes about integrating science in to the instructional day.
  - Focus the discussion on the comments she makes about meeting the needs of various learners using small groups.
  - Ask participants how they define differentiated instruction. Discuss and ask participants to record their definitions on their worksheets. See the Facilitation Strategies section for more information about this concept.
  - Give participants 5 to 10 minutes to work in pairs to complete the table on the worksheet.
  - Have participant pairs share their ideas with the group. When discussing grouping patterns, recall what Kathryn Carr-LeRoy says about grouping students heterogeneously. Make certain all participants know that this term means mixed-ability grouping.

### Think and Discuss

Using mixed-ability groups is a proven differentiated instruction strategy. Have participants form small groups and document how mixed-ability groups can benefit different students. Assign each group one of the following to discuss: English Language Learners, advanced readers, struggling readers, or students learning at grade-level. As a whole group, create a chart to compare the benefits of using this strategy.

## *Author Commentary* **Differentiating Instruction**

**Activity Instructions** Kathryn Carr-LeRoy indicates that small group instruction is ideal for meeting the needs of diverse learners. After discussing differentiated instruction with your group, brainstorm ways to differentiate a science lesson about weather.

My Definition of Differentiated Instruction
Concept or Skill
Weather Concept
Strategies to Differentiate Instruction
<p>My Learners (describe the needs of your students: ELL, advanced readers, etc.)</p> <p>Materials: Describe how you will select varied or leveled materials.</p> <p>Grouping Pattern: Describe how you will group students. What criteria will you use?</p> <p>Activities: Briefly describe the activities you will use in this lesson.</p>
Assessment
Describe how you will assess the students in your classroom. (Recall what Kathryn Carr-LeRoy says about using assessment with small groups.)

**Think and Discuss** Form small groups to discuss how mixed-ability groups can benefit these different students: English Language Learners, advanced readers, struggling readers, and students learning at grade level.

## Classroom Lesson Strategy Focus

In this activity, participants will respond to, discuss, and share their observations of the strategies used in the lesson.

### Guide to Viewing

You will watch excerpts from an authentic classroom lesson about the concept of electricity, taught by Cheryl Cetola. Go to page X to read the lesson plan and see student materials.

While, viewing, ask:

- How does this lesson structure help motivate students?
- How does Ms. Cetola manage the materials in the lab?
- How does Ms. Cetola facilitate lab procedures?

### Activity Instructions

Share information from the Facilitation Strategies (located in this section following the activities) prior to beginning this activity.

- Share with participants the Guide to Viewing (located on this page).
- Ask participants to read the lesson plan on page X prior to viewing.
- Click Teaching Science: Small Group Activities on the DVD main menu.
- Click Classroom Lesson on the submenu and watch the video segment.
- Form two groups of equal size and assign to each group one of the Strategic Focus areas listed in the two columns on the worksheet: Engaging Students or Managing a Lab.
- Ask each group to read the prompts to prepare for a second viewing of the video.
- Direct participants to take notes about how Ms. Cetola addresses the strategic focus assigned to their group as they watch the video segment a second time.
- Provide 5 to 10 minutes for participant groups to discuss and record their responses.
- Ask participants to choose a representative to “teach” or share their responses with the whole group.
- Encourage participants to fill in the incomplete sections of their worksheet and ask questions as each group shares their observations.

### Think and Discuss

As a group, identify challenges teachers have experienced conducting labs with students. Have participants write them in the left column of a two-column table. Form small groups to discuss and document solutions to each predicament. Participants should propose solutions in the right column of the table.

## **Classroom Lesson Strategy Focus**

**Activity Instructions** Cheryl Cetola creates a rich instructional experience that is highly engaging for students. Consider the components of the lesson that engage students and record them below. Also, describe how Ms. Cetola manages the materials and procedural tasks required for the lab station.

Strategy Focus One: Engaging Student	Strategy Focus Two: Managing a Lab
<p>Describe how Ms. Cetola engages students. Be specific.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>Describe the techniques Ms. Cetola uses to manage the lab materials and procedures.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Describe why you think Ms. Cetola's techniques work.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>How does Ms. Cetola react to student mistakes?</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>Describe what works to engage students in science. Why?</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>Describe how you manage lab materials and procedures in your classroom.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

**Think and Discuss** Describe and document the challenges you have experienced conducting labs. Create a two-column table and record the kinds of challenges you've encountered in the left column. In a right column, propose a solution for each.

### *Author Analysis* **Station Break**

In this activity, participants will select a topic and plan the learning stations they can use to teach it.

#### **Guide to Viewing**

You will watch a short segment in which Kathryn Carr-LeRoy discusses the classroom lesson. While viewing, listen to the benefits of using learning stations in the classroom:

- managing time
- grouping students with diverse skills
- working in teams
- allowing students to get up and move

#### **Activity Instructions**

Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.

- Share with participants the Guide to Viewing (located on this page).
- Click *Teaching Science: Small Group Activities* on the DVD main menu.
- Click *Author Analysis* on the submenu and watch the video segment.

Discuss, as a group, Kathryn Carr-LeRoy's analysis of the lesson. Ask students whether they agree with her analysis and, if not, explain why.

- Form pairs of teachers of the same grade.
- Refer participants to the lesson plan used by Ms. Cetola on page X.
- Ask each group to select a science topic to use to develop a unique stations-based lesson concept.
- Have participants write the concept they will teach in the star in the center of the page.
- Ask participants to brainstorm the learning stations they will use and to write down the skills and content addressed at each station in the circles surrounding the star.
- Ask each pair to work with one other pair (creating groups of four participants) to share their ideas, ask questions, and make suggestions.
- Select 2 or 3 pairs to share their plans with the entire group.

#### **Think and Discuss**

Ask participants to consider what Kathryn Carr-LeRoy says about integrating multiple skill and content areas in the stations approach. Have participants discuss how this integrated approach enhances instruction. As they discuss it, write the main ideas on chart paper. Ask participants to form grade-alike groups and assign to each group one main idea. Have the groups discuss why students at their level need the support indicated.

## **Author Analysis Station Break**

**Activity Instructions** Kathryn Carr-LeRoy indicates that the stations or learning centers used by Ms. Cetola are beneficial in many ways. Select a new science concept that you plan to teach this year and describe how you would create stations that integrate multiple skill areas and hands-on activities. Include the skills and content that will be addressed at each station.

STATION

STATION

STATION

NEW CONCEPT

STATION

STATION

**Think and Discuss** Describe how integrating multiple skill/content areas enhances learning in science. How do students at your grade level benefit from these enhancements?

### *Teacher Reflection* **Considerations**

In this activity, participants will reflect upon and discuss the things they consider when planning, delivering, and evaluating a lesson.

#### **Guide to Viewing**

You will watch a short segment in which classroom teacher Cheryl Cetola discusses planning science lessons. While viewing, listen as she discusses:

- using standards
- teaching in larger blocks of time
- motivating students to take ownership of learning

#### **Activity Instructions**

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Conduct, prior to watching the DVD, a whole group discussion about the importance of reflecting on one's own teaching practices. As a group, consider the following questions:
  - What do we gain from thoughtful reflection?
  - How do we effectively assess ourselves?
  - What metrics can we devise to ensure that our evaluations are valid?
- Share with participants the Guide to Viewing (located on this page).
- Click *Teaching Science: Small Group Activities* on the DVD main menu.
- Click *Teacher Reflection* on the submenu and watch the video segment.
- Ask participants to take 5 to 10 minutes to consider the ways they plan a lesson, deliver instruction, and measure the success of a lesson. Have them record their ideas on the worksheet.

Have students share their thoughts with the group. If necessary, use the *Facilitation Strategies* tips to direct the conversation.

#### **Think and Discuss**

Once teachers have evaluated a lesson and their instruction, how do they keep track of their evaluations? Discuss what teachers do to ensure that their evaluations continue to feed back into improving instruction. Have participants form pairs to create two new ideas for tracking improvements.

## **Teacher Reflection Considerations**

**Activity Instructions** Cheryl Cetola describes the various considerations she makes when planning science lessons. Discuss the considerations you make when planning, delivering, and evaluating a lesson. After your discussion, record your ideas and use them to track the success of your next lesson.

**Planning the Lesson**

List the things you consider before delivering a lesson. How do they assist you in your instruction?

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List at least one new consideration you will make before planning your next lesson.

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**Delivering the Lesson**

List the ways that you determine whether a lesson is going well and if issues need to be addressed during instruction.

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List at least one new consideration you will make when teaching your next lesson.

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**Evaluating the Lesson**

List the things you consider when determining whether a lesson is successful.

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List at least one new consideration you will make evaluating your next lesson.

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**Think and Discuss** Describe how you keep track of successful and unsuccessful attributes of a lesson. How do you plan for continuous improvement in your teaching? Create two new ideas for tracking improvement in your teaching.

## *Extension Activity* **Looking at Student Work**

In this activity, participants will learn to evaluate student work for purposes other than assessment.

### **Guide to Looking at Student Work**

As you review student work in a collaborative environment, keep the following guidelines in mind:

- Focus on what the student has provided as evidence of learning.
- Examine the work for information about why the student gave certain responses and what it tells you about his or her thinking process.
- Look for patterns that indicate how students came to produce this work or these responses.
- Be open-minded when listening to other teachers' perspectives on the work.

### **Activity Instructions**

Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.

- Direct participants to page X of the guide or make and distribute copies of the student work to each participant.
- Give participants 5 to 10 minutes to consider the student work and respond to the questions posed on the activity sheet.
- Discuss as a group each aspect of the student work. Ask participants to share their responses. If necessary, use the *Facilitation Strategies* to direct the conversation.

### **Think and Discuss**

Informing instruction is one benefit of analyzing student work. Ask participants to consider what action they would take upon discovering an error type present in just four student work samples. Would they conduct a further assessment to measure how pervasive a problem it is? Would they reteach the concept to the whole class? Would they conduct a tutorial for these students? How would it be managed? As a group, discuss the difference between each of these strategies: assessment, reteaching, and tutorials.

## *Extension Activity* **Looking at Student Work**

**Activity Instructions** Now that you have looked at the Teaching Science: Small Group Activities video, you are prepared to consider ways to use student work to inform your teaching practice. This activity refers to the student work material shown on page X. First, analyze the student work and record your responses to the questions below. Then, as a group, discuss and record the observations of others.

Student Work	My Response	Others' Responses
<p><b>Student Understanding</b> Is there evidence that the student understood what was asked of him or her?</p>		
<p><b>Prior Knowledge</b> What does the student work tell you about the prior knowledge of the student? What does he or she know? What doesn't he or she know?</p>		
<p><b>Looking at Question #3</b> Is there sufficient evidence that this student understands what a conductor is?</p>		
<p><b>Looking at Question #4</b> What else can you learn about this student's understanding of the lesson and about the effectiveness of the instruction?</p>		

**Think and Discuss** Consider this scenario: In a class of twenty-five students, you see four examples of the same error type. How would you proceed? Describe the different approaches you could take.

*Author Commentary*  
**Differentiating Instruction**

**Differentiated Instruction**

Participants may not share a common definition or concept of differentiated instruction. To clarify this concept, explain that it is generally accepted that differentiated instruction refers to the practice of varying the materials, activities, grouping patterns, and assessment to meet the needs of all learners. Needs can be described as 1) academic, including reading levels, language proficiency, etc., 2) learning styles, including preferences for visual or oral communication, and 3) interests.

A common misconception about differentiated instruction is that teachers need to create individual lesson plans for each student. Planning for varying needs means that teachers must understand the academic needs, personal interests, and learning preferences of their students. A class profile allows teachers to carefully select leveled materials and tasks that involve all students in an engaging and challenging classroom.

**Small Group Instruction**

Small groups facilitate the student-to-student interaction that supports differentiated instruction. The benefits of small group structures are numerous, but include

- using mixed-ability groups, allowing students to learn from one another
- creating learning stations that incorporate tiered or multi-leveled activities and materials
- incorporating informal assessment to better assess the various levels of student understanding and skill

## Classroom Lesson Strategy Focus

### Engaging Students

Getting students actively involved in science tasks increases the likelihood that they will remember what they have learned. The use of small groups can facilitate engagement.

As the group discusses this topic, be sure to ask them to consider these questions:

- Is there anything inherent to small group work that facilitates motivation?
- How does the use of integrated study help engage students?
- How do such activities engage students in the study of science?
- Describe an experience when you used small groups unsuccessfully. What was it about the experience that contributed to its outcome?

### Managing a Lab

Labs facilitate valuable experiential learning in the classroom, but effective management of the materials and procedures for conducting experiments can be elusive. As the group discusses this topic, ask them to address the following questions:

- How does Ms. Cetola involve students in materials management?
- What techniques does she use to instruct students about procedures?
- What strategies does she use to assist students who struggle with procedures?
- Why is lab management so important in science instruction?

### *Author Analysis* **Station Break**

Remind teachers that learning stations should promote solid science instruction. Some of the highlights of Cheryl Cetola's lesson included

- fostering science and inquiry activities
- engaging students in science process skills such as hypothesizing, collecting data, making observations, and drawing conclusions
- using hands-on activities
- monitoring learning using informal assessment
- integrating multiple subject areas into science instruction, including reading, writing, and mathematics

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### *Teacher Reflection* **Considerations**

#### **Planning the Lesson**

When Cheryl Cetola discusses her approach to planning, she mentions her consideration of the standards, the amount of time needed for science instruction, and how to engage students in learning. Ask participants to think about the following questions when reflecting on their own planning process:

- Does my lesson address the standards?
- Do I have a classroom management plan?
- Did I set reasonable and attainable goals for learning?
- How did I select materials and tools? Did I consider the diverse needs of my class?

#### **Delivering the Lesson**

There are many techniques that teachers use to assess their instruction while delivering instruction. Informal assessment of student understanding of directions and content allows teachers to redirect students when necessary. Teachers should ask themselves the following questions:

- Do students understand the concepts?
- Are students on task and engaged in their learning?
- Are students confused about what they are supposed to do?
- Are students able to move about the room, gather materials, and learn without distraction?

#### **Evaluating the Lesson**

Post-lesson evaluation is critical for teachers to improve instruction. Teachers should ask themselves the following questions:

- What did students learn in this lesson?
- Did students achieve the goals set forth?
- What evidence do I have that learning occurred?
- What went right? What went wrong? How can I improve?

## *Extension Activity*

# Looking at Student Work

As you discuss student work, teachers may need more information to understand and value the process. Share the following information where appropriate.

### **The Value of Student Work**

Teachers can benefit from regularly working in small groups to look at student work. Student work provides evidence of the following:

- understanding of the content
- level of skill
- approach to the task

### **A Shift from Assessment**

Looking at student work to understand student thinking is somewhat different than assessing it. Participants should consider the following guidelines when looking at student work:

- Focus on what the student has provided as evidence of learning.
- Examine the work for information about why the student gave certain responses and what it tells you about his or her thinking processes.
- Look for patterns that indicate how students came to produce this work or these responses.
- Be open-minded when listening to other teacher's perspectives on the work.

### **The Benefits of Collaboration**

It is essential that teachers work together to evaluate student work after they have formed their initial responses. When teachers discuss the student work, opinions may differ about what the work means. Encourage productive discussion, reminding teachers to be open-minded about the varying opinions of the work. The goal of this collaboration is twofold:

- to learn to recognize and act on patterns seen in student work samples
- to enable teachers to build a strong professional development community by sharing multiple perspectives

### **Taking the Process One Step Further**

Set up your own ongoing student work discussion group. Ask teachers to bring student work samples to discuss. They should select work that reflects instruction on a standard for which all students in their classrooms are responsible.



**Teaching  
Science:  
Whole Group  
Activities**



# Teaching Science: Whole Group Activities

## Workshop Focus

Teachers use whole group instruction to meet a wide variety of needs in the classroom. Making the best use of this time is critical to keeping students on task and engaged in learning. Whole group instruction needs to be used strategically, interspersed with student-directed activities. This professional development workshop will enhance participants' understanding and ability to use whole group instruction effectively in their science instruction.

## Workshop Preview

This professional development workshop is delivered in segments, most of which are comprised of a video clip and an accompanying activity. The video-based segments include

- Author Commentary—Jo Anne Vasquez, Ph.D., a Macmillan/McGraw-Hill science author, discusses key concepts and sets the context for viewing the classroom lesson.
- Classroom Lesson—Segments from an authentic classroom lesson illustrate key concepts and strategies participants can use in their classrooms.
- Author Analysis—The program author provides thoughtful analysis of the activities and instructional strategies used by the teacher in the classroom lesson.
- Teacher Reflection—The teacher of the classroom lesson reflects on the planning strategies used for the lesson.

Each video segment is accompanied by an activity. The activities in this program include

- Experiential Learning—Consider why experiential learning is critical to student success.
- Asking the Right Questions—Identify questioning strategies that promote learning and motivate students.
- Maximizing Whole Group Instruction—Learn to plan effective whole group and small group interactions in the classroom.
- Sequencing Science Activities—Develop a strategy for sequencing science activities to promote achievement.

In addition to the four video-based workshop activities, there is one extension activity—Reading Student Work—in which participants will use student work to identify deficiencies in conceptual or procedural knowledge.

## Facilitation Strategies

To help you build knowledge of strategies, the *Facilitation Strategies* contains useful information to share with participants. In some cases, suggestions are made for stimulating discussion during activities. We recommend that you read through the section that pertains to each activity prior to beginning.

## Materials Used in the Video Classroom

The lesson plan used for the video classroom lesson appears on page X in the Lesson Materials section at the back of this guide. You are encouraged to refer to this plan throughout the chapter as a tool for understanding the context of the video segments.

Lesson worksheets, materials lists, and sample student work are also included to supplement the viewing experience.

### Author Commentary

# Experiential Learning

In this activity, participants will discuss differentiated instruction and brainstorm ways to meet the diverse needs of learners.

#### Guide to Viewing

You will watch a short segment in which Jo Anne Vasquez discusses key concepts in science instruction. As you watch this segment, consider the following questions:

- What should teachers consider when planning science instruction?
- Why is experienced-based learning so important?
- How do teachers know when students are learning?

#### Activity Instructions

Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.

- Share with participants the Guide to Viewing (located on this page).
- Click *Teaching Science: Whole Group Activities* on the DVD main menu.
- Click *Author Commentary* on the submenu and watch the video segment.
- Discuss as a group the comments Jo Anne Vasquez made about hands-on or experiential learning. Ask participants how often they do hands-on labs in their classes.
- Form pairs of teachers who teach the same grade.
- Give participants 5 to 10 minutes to identify two concepts that they teach, devise a hands-on activity for each, and list the expected outcomes.
- Select 3 or 4 ideas to share with the whole group. Ask teachers to identify alternate strategies for teaching each concept. Compare the activities that don't include hands-on learning to those that do. Ask participants to describe the advantages of using the experiential learning approach.

#### Think and Discuss

Jo Anne Vasquez discusses *inquiry* in her commentary. Have participants define *inquiry* and its role in science instruction. Ask them to form pairs with teachers of the same grade and write examples of inquiry appropriate for their level. As a group, discuss examples from participants at each grade.

## Author Commentary Experiential Learning

**Activity Instructions** Jo Anne Vasquez emphasizes the importance of experiential or hands-on learning. Record two concepts, activities, and outcomes that use experiential learning. Two examples are shown.

Concept	Students Do	Students Learn
<b>Photosynthesis</b>	<b>Procedure:</b> Place two identical plants in two habitats—one with sunlight, one deprived of light. Keep other variables to a minimum. Hypothesize outcome. Record observations every other day for two weeks. Make a conclusion.	<ul style="list-style-type: none"> <li>Habitat affects how plants grow.</li> <li>Sunlight is essential to plant life.</li> <li>Appropriate use of science vocabulary: photosynthesis, habitat, hypothesis, conclusion</li> </ul>
<b>Electromagnetism</b>	<b>Procedure:</b> Hypothesize what makes an electromagnet stronger. Build an electromagnet by winding a wire 20 times around a nail and attach each end to a D-cell battery. Predict the number of paper clips it can hold. Test the prediction. Add a second battery. Predict how many more paper clips it will hold. Test the prediction. Make a conclusion.	<ul style="list-style-type: none"> <li>Increased current makes an electromagnet stronger.</li> <li>An electromagnet consists of a coil of wire with an electric current passing through it.</li> <li>Science process skills: hypothesize, predict, test, conclusion</li> </ul>

**Think and Discuss** What is “inquiry” in science instruction? Describe the role you think it plays and generate an example appropriate for the level you teach.

## Classroom Lesson

# Asking the Right Questions

In this activity, participants will identify questioning strategies that help students internalize learning.

### Guide to Viewing

You will watch excerpts from an authentic classroom lesson taught by Cheryl Souza-Canuel about the concept of magnetism.

Go to page X to read the lesson plan and see student materials.

As you watch this segment, consider the following questions:

- How does the lesson opener prepare students for learning?
- How does Ms. Souza-Canuel determine what students have learned?
- How does Ms. Souza-Canuel use questioning as a strategy?

### Activity Instructions

Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.

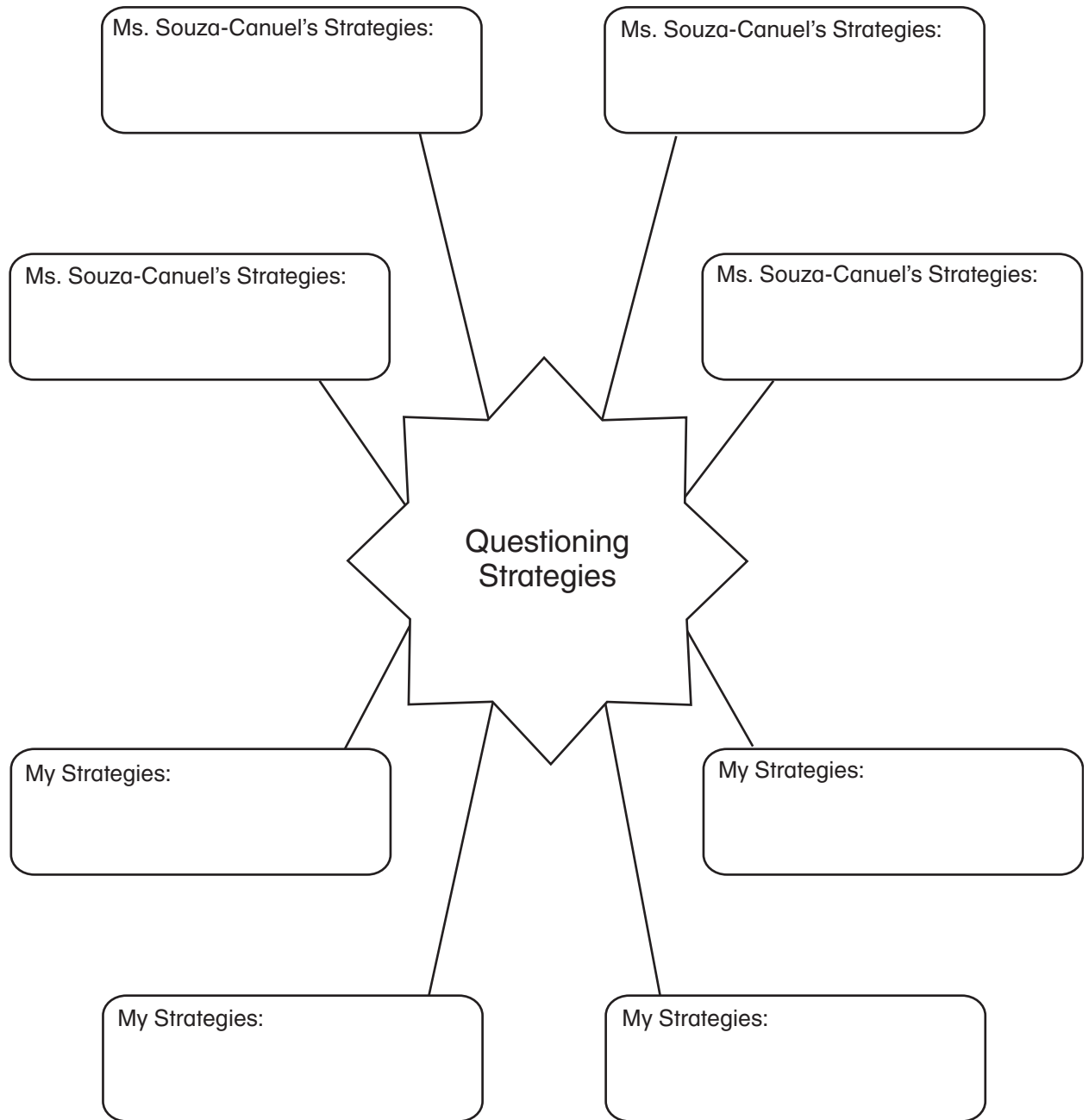
- Share with participants the Guide to Viewing (located on this page).
- Ask participants to read, prior to viewing, the following items:
  1. Lesson plan on page X
  2. *Asking the Right Questions* activity worksheet
- Click *Teaching Science: Whole Group Activities* on the DVD main menu.
- Click Classroom Lesson on the submenu and watch the video segment.
- Have participants record on their worksheets their observations of the questioning strategies used by Ms. Souza-Canuel.
- Form groups of 3 or 4 participants.
- Provide 10 to 15 minutes for participants to discuss the techniques they observed, come up with four additional ways to use questioning, and record them on the worksheet.
- Open up the discussion to the entire group. Write the alternate strategies on a white board or chart paper.

### Think and Discuss

Ms. Souza-Canuel does not always answer students' questions immediately or directly. As a group, describe several reasons why she uses this strategy. Ask participants to list the benefits of this strategy and chart them on paper.

## Classroom Lesson Asking the Right Questions

**Activity Instructions** Cheryl Souza-Canuel uses effective questioning techniques for multiple purposes. Observe Ms. Souza-Canuel and record the questioning techniques you see her using in this lesson. Add strategies that you use or will begin using in your class.



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**Think and Discuss** Cheryl Souza-Canuel does not always directly answer questions that students pose. Describe reasons she may have for using this strategy. What potential benefits can be found in this strategy?

### Author Analysis

# Maximizing Whole Group Instruction

In this activity, participants will discuss and record their observations of the best use of whole group instruction.

#### Guide to Viewing

You will watch a short segment in which Jo Anne Vasquez comments on the classroom lesson. As you watch this segment, listen as she discusses the strategies used by Cheryl Souza-Canuel, which include

- grouping structures that build independence
- inquiry-oriented teaching
- modeling
- wait time during questioning

#### Activity Instructions

Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.

- Share with participants the Guide to Viewing (located on this page).
- Click *Teaching Science: Whole Group Activities* on the DVD main menu.
- Click *Author Analysis* on the submenu and watch the video segment.
- Discuss as a group Jo Anne Vasquez's analysis of the lesson. Ask students whether they agree with her analysis and, if not, to explain why.
- Focus the discussion on her comments about the use of whole group instruction. Use the table provided on the activity worksheet to discuss discrete elements of the lesson.
- Ask participants to work independently for 5 minutes to generate additional ideas for whole group instruction.
- Form groups of 3-4 participants to share their ideas.
- Allow each group to share with the whole group their observations, to ask questions, and to make suggestions.

#### Think and Discuss

As a group, revisit the concept of *inquiry*. Ask participants how a classroom teacher can use whole group instruction to facilitate *inquiry*. Record their ideas on a piece of chart paper. Then, ask participants if there are particular points during a lesson that work well for generating *inquiry*-type thinking.

*Author Analysis*  
**Maximizing Whole Group Instruction**

**Activity Instructions** Jo Anne Vasquez describes several ways that whole group instruction can be effective. Two of the practices she identifies are listed below; next to them are several reasons why they are valuable instructional strategies. In the remaining spaces, record other effective whole group strategies that you observed in the video or have used in your classroom and the value of including them in instruction.

Whole Group Technique	Value
Present a pre-lab explanation.	<ul style="list-style-type: none"> <li>• models procedures</li> <li>• answers questions about materials</li> <li>• identifies expectations</li> <li>• provides direction</li> <li>• saves time</li> </ul>
Ask students if anything in the experiment surprised them.	<ul style="list-style-type: none"> <li>• motivates students to revisit predictions</li> <li>• can be used to ask probing questions</li> <li>• can be used to summarize or ask a student to summarize key concepts</li> <li>• reteaches or reviews misconceptions that persist</li> </ul>

**Think and Discuss** How can a classroom teacher use whole group instruction to facilitate inquiry? Are there particular points during a lesson that work well for generating inquiry-type thinking?

### *Teacher Reflection*

# Sequencing Activities

In this activity, participants will select a topic and plan a sequence of increasingly complex activities to teach this topic.

#### **Guide to Viewing**

You will watch a short segment in which classroom teacher Cheryl Souza-Canuel comments on planning for science lessons. As you watch this segment, listen as she discusses

- time management
- grouping students
- differentiated instruction
- sequenced activities

#### **Activity Instructions**

Share information from the Facilitation Strategies (located in this section following the activities) prior to beginning this activity.

- Share with participants the Guide to Viewing (located on this page).
- Click Teaching Science: Whole Group Instruction on the DVD main menu.
- Click Teacher Reflection on the submenu and watch the video segment.
- Discuss, as a group, Cheryl Souza-Canuel's considerations when teaching science.
- Form groups of 2 or 3 participants who teach the same grade.
- Ask each group to select a science topic.
- Have participants write the concept they will teach on their worksheet pages.
- Ask participants to brainstorm three activities they can use to teach this concept. Each activity should build in complexity and use skills they have mastered in the preceding activities.
- Ask participants to choose a representative to share their ideas with the others in the workshop group.
- Allow each group to share observations, ask questions, and make suggestions.

#### **Think and Discuss**

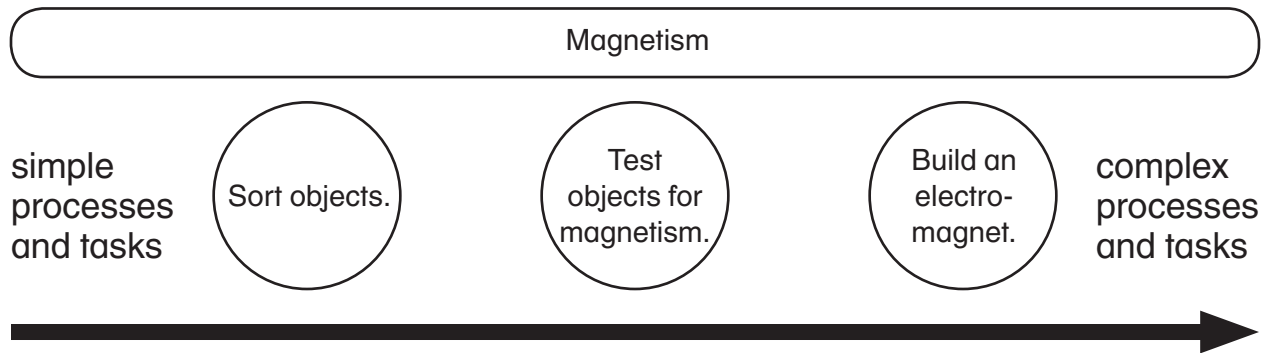
Ms. Souza-Canuel discusses how she plans her science activities. Ask participants to work independently to record at least four things they consider when planning activities that occur in one unit. Ask them to form groups of 3 or 4 to share and discuss their ideas.

## *Teacher Reflection* **Sequencing Activities**

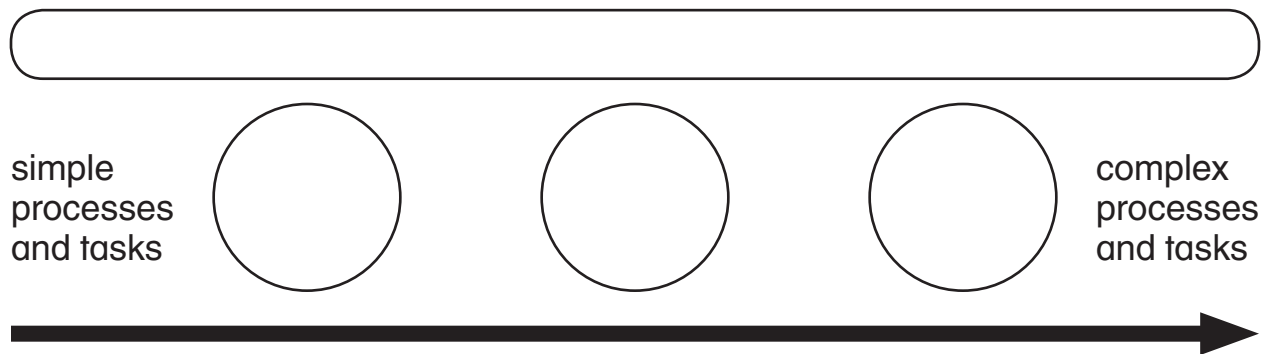
**Activity Instructions** Cheryl Souza-Canuel refers to the importance of sequencing hands-on activities to allow students to experience initial success with a lab. An example of this sequencing is shown below. Select a science concept that you teach and list examples of increasingly complex activities you might use to teach the concept.

### LAYERS OF COMPLEXITY

Concept



Concept



**Think and Discuss** Ms. Souza-Canuel discusses how she plans her science activities. What do you consider when planning the activities in an entire unit? List at least four things.

### Extension Activity

# Reading Student Work

In this activity, participants will analyze student work from the classroom lesson to identify gaps in conceptual knowledge.

#### Guide to Reading Student Work

Student work can reveal a great deal about the depth of knowledge of your students. As you read it, consider the following questions:

- Does the work tell you anything about how the student perceived the question?
- What can this perception tell you about the level of understanding of the concept?

#### Activity Instructions

Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.

- Direct participants to page X of the guide or make and distribute copies of the student work to each participant.
- Give participants 5 to 10 minutes to read the prompt and student responses. Be certain teachers have familiarized themselves with the lesson plan of the video lesson so that they have a context for the student activity.
- Have participants review the knowledge and skills that the teacher was expecting from students (located on the Workshop Activity sheet).
- Discuss as a group the kinds of questions brought about by the work. If necessary, use the *Facilitation Strategies* tips to direct the conversation.
- Give participants 5 to 10 minutes to think about and record their ideas for designing instruction that responds to their conclusions about the student work.
- Have 3 or 4 participant volunteers share their ideas.

#### Think and Discuss

Teachers have many ways to identify deficiencies in conceptual or procedural knowledge. Ask participants to work with 1 or 2 other teachers from their grade level to list strategies for identifying these gaps. Ask participants to describe their recent observations of conceptual or procedural gaps in student knowledge, and to discuss the measures they have taken to close these gaps.

## *Extension Activity* **Reading Student Work**

**Activity Instructions** Consider the responses to the electromagnet activity shown in the student work. Compare them against the teacher’s expectations and record the questions you have regarding the depth of understanding reflected in the work. Consider the kind of remediation that the work suggests and describe it in the second table below.

**Knowledge or skills the teacher expected:**

- Observe that the electromagnet’s strength increased.
- See the causal relationship between the increased current and the strength of the magnet.
- Use scientific vocabulary appropriately.
- Follow procedural directions accurately.

Questions about Student Understanding

Next Steps
What instructional steps can you take to respond to your conclusions?

**Think and Discuss** Besides examining student work, list other ways you identify gaps in conceptual or procedural knowledge. Describe your recent observations of gaps and the measures you took to close them.

## *Author Commentary* **Experiential Learning**

### **Experiential or Hands-On Learning**

Science instruction is uniquely suited for hands-on learning because science is rooted in direct observation, experimentation, and data collection. Valuing science means teaching students how to pursue evidence for their claims. Sometimes teachers are faced with challenges to implementing an experiential approach.

When participants discuss what students learn from experiential learning they may focus only on content-related goals. There are, however, other skills that students learn from hands-on experiences. Be certain they make a comprehensive list, including

- using scientific vocabulary in appropriate contexts
- practicing science process skills such as hypothesis, analysis, prediction, and conclusion
- following stepped procedures
- witnessing scientific phenomena first-hand
- learning to work cooperatively in a team
- collaborating with others to discuss scientific ideas and devise experiments
- formulating questions about their experiments

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### *Classroom Lesson* **Asking the Right Questions**

Cheryl Souza-Canuel is very effective at using questioning strategies to extend learning opportunities for her students. Be sure participants are aware of them.

#### **Using Wait Time**

When Cheryl Souza-Canuel asks questions, she gives students ample wait time. Wait time is essential because it allows students to carefully consider the question and formulate their answer. This strategy is especially effective with English Language Learners but should be applied in all situations. In a whole group setting, count to at least five before calling on students to answer.

#### **Asking Higher-Level Questions**

Ms. Souza-Canuel often poses questions that engage higher order thinking skills. Asking students to predict or analyze results leads them to ask their own questions—the kinds of questions effective scientists pose.

#### **Sequencing Questions**

Ms. Souza sequences questions from the simple (What happened?) to the complex (What would happen if...?). Sequencing helps students develop the inductive reasoning skills needed to pose good scientific questions.

*Author Analysis***Maximizing Whole Group Instruction**

Clearly, there are times when whole group instruction works well and times when it is not the best instructional approach. Teachers need to identify the times when it is successful and the times when a different configuration for learning works better, as Cheryl Souza-Canuel does.

Although each lesson is unique and will demand consideration for the context of instruction, whole group instruction often works well in the following situations:

- introducing new concepts
- modeling procedures
- explaining materials
- demonstrating concepts
- warning students of safety concerns
- summarizing learning
- clarifying misconceptions

---

*Teacher Reflection***Sequencing Activities**

Introducing content and new skills in a planned sequence provides students with optimal access to the curriculum. As teachers consider how to sequence instruction, be sure they consider the following concepts:

- Cognitive research reveals that new learning builds on a foundation of existing knowledge and skills. Consider starting with a lesson that helps students access their prior knowledge before introducing new concepts.
- Giving students early success builds their confidence about performing more challenging tasks.
- Graduated activities (those that transition from simple to more complex skills and content) bridge the gap between what is known and unknown.
- Effective grouping strategies can provide to students with lower level skills the support they need to propel their learning.

### *Extension Activity*

## Reading Student Work

What does student work tell teachers beyond whether an answer is correct or incorrect? Does it illuminate how a student perceived the question? What can this perception tell you about the level of understanding of the concept?

These questions are worth pursuing by looking at student work because their answers can help teachers address conceptual deficiencies that are not otherwise apparent.

As participants look at the student work, they should be asking themselves questions, such as whether students

- understand the role of the coils in the experiment
- understand the relationship between the coils and the nail in the experiment
- understand the relationship between the amount of current and the strength of magnetism
- know the proper science vocabulary
- know how to respond to the question

### **Student Work Samples**

How did increasing the number of coils affect the strength of the electromagnet?

Student Group 1 Response: Making it stronger with 40 coils of wire.

Student Group 2 Response: The increasing of the number of coils affect the strength of the electromagnet is we round the coils 20 times and the paper clips plus the rusty nail are electromagnet.

Student Group 3 Response: It increase by it got stronger and stuck more paperclips when you increased it and it became stronger.



**Supporting  
Classroom  
Management**



# Supporting Classroom Management

## Workshop Focus

Highly effective teachers know that successful instruction requires skillful classroom management. Teachers must plan, organize, and practice classroom management to effectively implement instruction and prepare students for learning. This professional development workshop will help participants develop their knowledge of classroom management strategies and implementation.

## Workshop Preview

This professional development workshop is delivered in segments, most of which are comprised of a video clip and an accompanying activity. The video-based segments include

- **Author Commentary**—Kathryn Carr-LeRoy, a Macmillan science program author, discusses key concepts and sets the context for viewing the classroom lesson.
- **Classroom Lesson**—Segments from authentic classroom lessons illustrate key concepts and strategies that participants can use in their own classrooms.
- **Author Analysis**—The program author provides thoughtful analysis of the classroom management used by the teachers in the classroom lessons.
- **Teacher Reflection**—The teachers of the classroom lessons reflect on the classroom management used in the lesson.

Each video segment is accompanied by an activity. The activities in this program include

- **Plan It!**—Discover what it means to communicate expectations, create routines, and define procedures.
- **Finding What Works**—Brainstorm strategies to address four critical areas of classroom management.
- **Many Purposes**—Identify benefits of effective classroom management for students and teachers.
- **Different Approaches**—Reflect on the different approaches teachers can use for classroom management.

In addition to the four video-based activities, there is one extension activity—**Creating Effective Materials**—in which you will plan effective teacher-made materials for a lesson of your own.

## Facilitation Strategies

To help you build knowledge of classroom management strategies, the *Facilitation Strategies* contains useful information to share with participants. In some cases, suggestions are made for stimulating discussion during activities. We recommend that you read through the section that pertains to each activity prior to beginning.

## Materials Used in the Video Classrooms

The lesson plans used for the model classroom lessons appear on page X in the Lesson Materials section at the back of this guide. You are encouraged to refer to these plans throughout the chapter as a tool for understanding the context of the video segments.

Lesson worksheets, materials lists, and sample student work are also included to supplement your viewing experience.

## Author Commentary Plan It!

In this activity, participants will define what Kathryn Carr-LeRoy means when she talks about addressing expectations, routines, and procedures and determine how to use them in their own classrooms.

### Guide to Viewing

You will watch a short segment in which Kathryn Carr-Leroy discusses key concepts in effective classroom management for science instruction. As you watch this segment, consider the following questions:

- Why is classroom management essential?
- Why is classroom management challenging for many teachers?
- Where does planning fit in?

### Activity Instructions

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Share the Guide to Viewing located on this page with participants.
- Click *Supporting Classroom Management* on the DVD main menu.
- Click *Author Commentary* on the submenu and watch the video segment.
- Discuss as a group the comments Kathryn Carr-LeRoy makes about addressing classroom management.
- Ask participants to form groups of three and list specific activities that address each of the three components on the worksheet.
- Have participant volunteers share their ideas with the whole group.
- Give participants 5 to 10 minutes to define an implementation plan for addressing each of these items in the following week of lessons.

### Think and Discuss

Classrooms are dynamic and unique, and each one reacts differently to content and activities. Ask participants to work independently to describe their classroom dynamic and consider how it affects classroom management decisions. Have them describe at least three examples of some decisions they have made in response to the dynamic. Reconvene the whole group and ask volunteers to share what they have written.

## **Author Commentary Plan It!**

**Activity Instructions** Kathryn Carr-LeRoy discusses critical components of effective classroom management. Work with a small group to describe what kinds of issues need to be addressed in each of the columns below. Outline specific plans for putting these concepts into practice.

Communicate Expectations	Routines	Procedures
<p style="text-align: center;"><b>Implementation Plan</b></p> <p>Describe how you will implement these components in your classroom.</p>		

**Think and Discuss** Classrooms are dynamic and unique, and each one reacts differently to content and activities. Describe your classroom dynamic and how it affects classroom management decisions. Then, describe at least three examples of some decisions you have made in response to the dynamic.

### Classroom Lesson

# Finding What Works

In this activity, participants will observe classroom management strategies seen in the video and identify ways to transfer these strategies to their own classrooms.

#### Guide to Viewing

You will watch excerpts from two authentic classroom lessons taught by Cheryl Cetola and Cheryl Souza-Canuel.

Go to page X to read the lesson plans and see student materials.

While viewing, ask:

- How do students know what to do in the activity?
- What role do materials play in these classes?
- What kinds of groups are used?
- Can I use this strategy in my classroom?

#### Activity Instructions

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Share with participants the Guide to Viewing (located on this page).
- Ask participants to complete the left-hand column of the table on their worksheet pages while watching the video.
- Click *Supporting Classroom Management* on the DVD main menu.
- Click *Classroom Lesson* on the submenu and watch the video segment.
- Discuss as a group the observations made by participants regarding the activities on the worksheet. Refer to the *Facilitation Strategies* if participants are unable to identify the ways each component was used.
- Ask participants to find a partner and work together to define strategies they can use to address each component of classroom management.
- Give participant pairs 5 to 10 minutes to discuss and record their responses.
- Ask participant volunteers to share their strategies with the whole group.

#### Think and Discuss

Form small groups to discuss why planning is an essential part of classroom management. Participants should address what kind of planning needs to occur for different kinds of activities, such as labs, reading, or stations.

## *Classroom Lesson* **Finding What Works**

**Activity Instructions** Both teachers effectively use classroom management to deliver lessons that include hands-on activities and science experiments. As you watch, observe the strategies included for each of the lesson components listed below. (One has been listed for you.) Then, explain how you can address each of the components in your own lessons.

Science Lessons on Video	Strategies for My Class
Pre-Lab Discussion	<ul style="list-style-type: none"> <li>• The purpose for learning is given during the lab set-up.</li> </ul>
Giving Directions	
Distributing Materials	
Managing Groups	

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**Think and Discuss** Why is planning so important for classroom management? Discuss with your colleagues the preparation procedures that you consider successful for several different activity types.

### *Author Analysis*

## Many Purposes

In this activity, participants will identify the benefits of good classroom management and drawbacks of poorly managed classrooms.

#### **Guide to Viewing**

You will watch a short segment in which Kathryn Carr-LeRoy comments on the classroom lesson. As you watch this segment, listen as she details the benefits of using learning stations in the classroom, including

- managing time
- giving directions
- benefits of classroom management planning

#### **Activity Instructions**

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Share with participants the Guide to Viewing (located on this page).
- Click *Supporting Classroom Management* on the DVD main menu.
- Click *Author Analysis* on the submenu and watch the video segment.
- Discuss as a group Kathryn Carr-LeRoy's analysis of the lesson.
- Ask participants whether they agree with her analysis and, if not, to explain why.
- Direct the discussion to her comments regarding the benefits that effective classroom management has for students and teachers.
- Ask participants to record the primary benefits on their worksheet pages.
- Discuss what happens when classroom management is not in place or when it fails to work. What are the outcomes for students? Teachers? Record these ideas in the "Drawbacks" section of each column on the worksheet page.

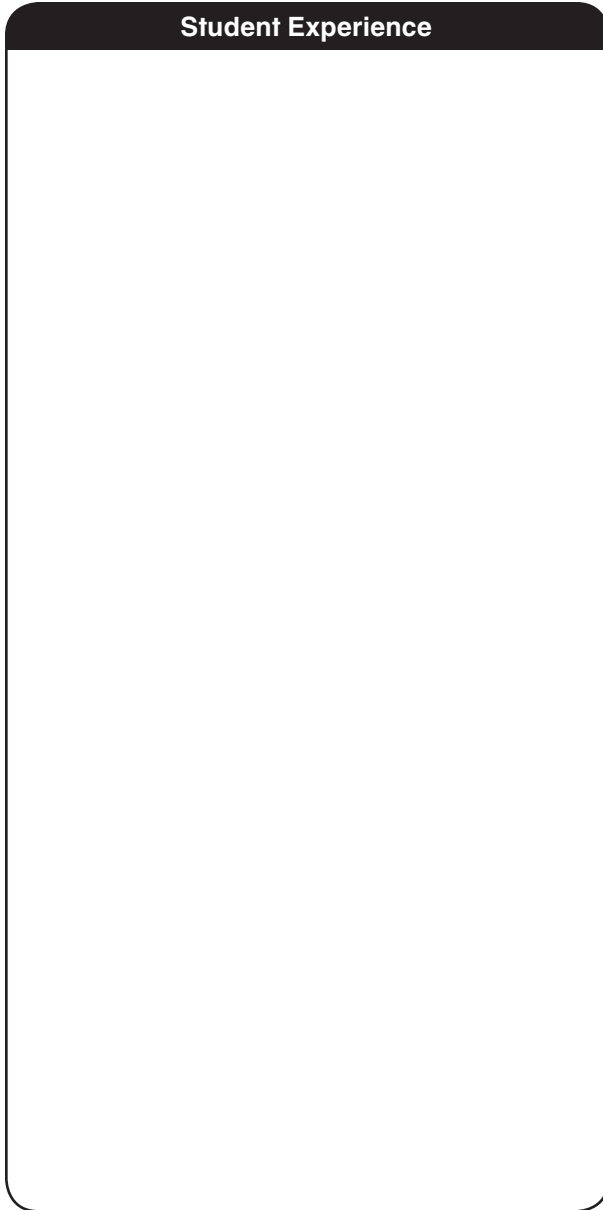
#### **Think and Discuss**

Labs and hands-on activities are often perceived as being overly time consuming. Ask participants to work in pairs to discuss how effective classroom management creates more time for learning. Ask each pair to come up with two examples. Then, ask each pair to share their examples with another pair.

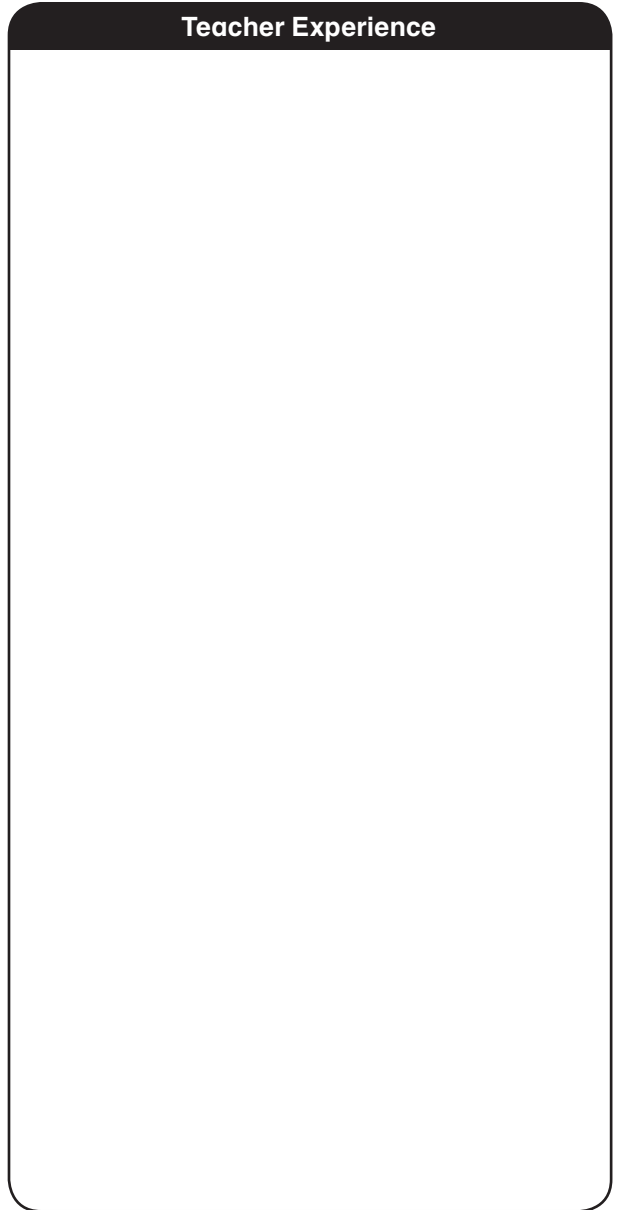
## *Author Analysis* **Many Purposes**

**Activity Instructions** Kathryn Carr-LeRoy discusses the benefits of effective classroom management for teachers and students. After watching her analysis, use your own words to describe how effective classroom management benefits students and teachers. Also consider how a poorly managed classroom impairs students and teachers. Record your thoughts below.

### **Student Experience**



### **Teacher Experience**



**Think and Discuss** Consider the time needed for conducting quality science instruction, including strategies such as labs and hands-on activities. Describe the link between time management and learning.

### *Teacher Reflection*

# Different Approaches

In this activity, participants will consider and discuss the strategies used by Ms. Souza-Canuel and Ms. Cetola. Each teacher uses a different approach.

#### **Guide to Viewing**

You will watch a short segment in which each classroom teacher discusses the classroom management they use in their science lessons. Note how each teacher uses a different approach and focuses on different aspects of classroom management.

- How are they similar?
- How are they different?

#### **Activity Instructions**

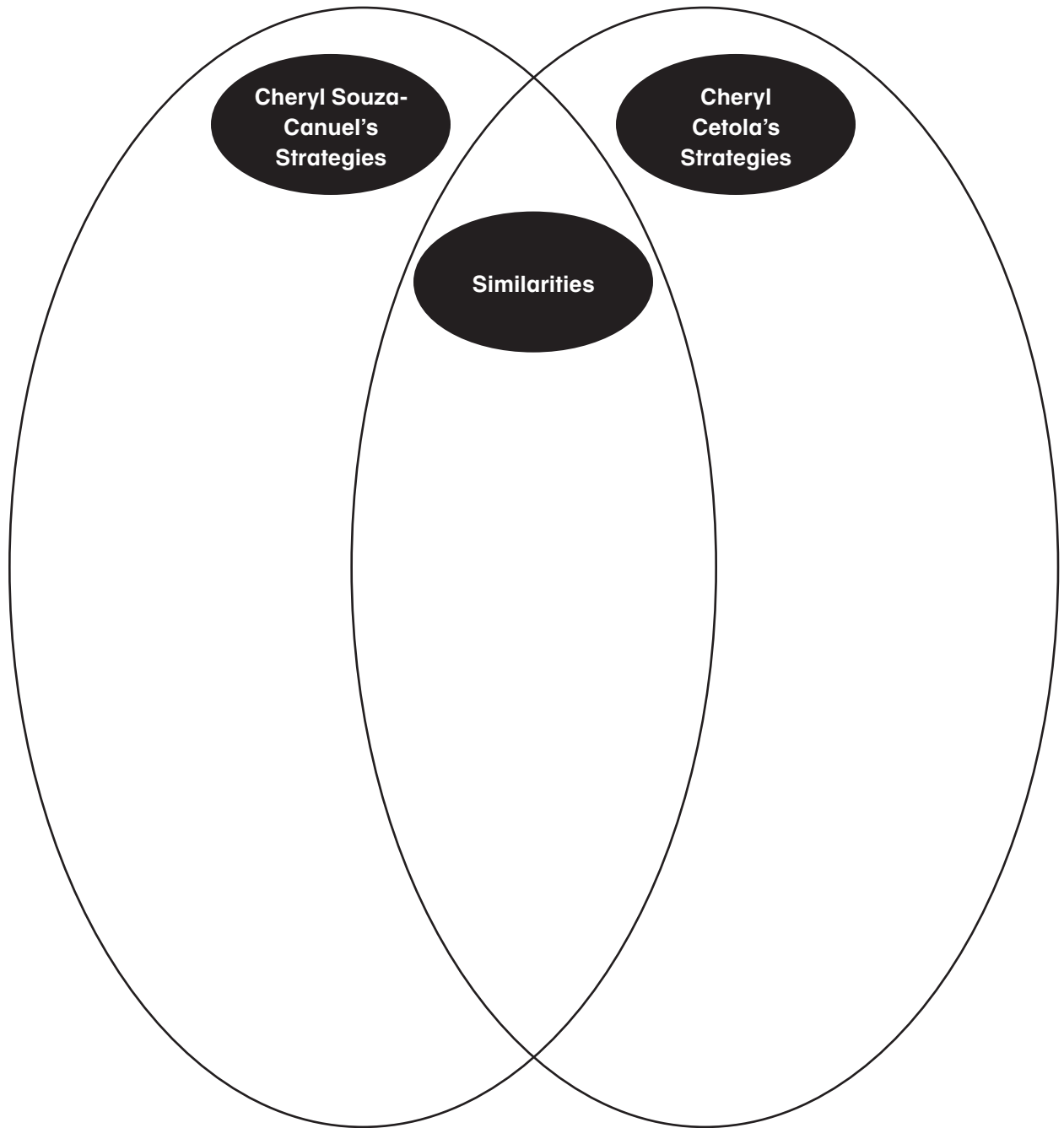
- Share information from the Facilitation Strategies (located in this section following the activities) prior to beginning this activity.
- Conduct, prior to watching the DVD, a whole group discussion about the importance of listening to and observing best practices. As a group, consider the following questions:
  - What do teachers gain from watching colleagues?
  - Is it worth the effort to try strategies that work in other teachers' classes?
  - What criteria do participants use to reject a strategy when it is suggested to them?
- Share with participants the Guide to Viewing (located on this page).
- Click Supporting Classroom Management on the DVD main menu.
- Click Teacher Reflection on the submenu and watch the video segment.
- Give participants 5 to 10 minutes to complete the Venn diagram by organizing the strategies used by the two teachers.
- Review, if desired, the classroom lessons in the previous video segment to see the strategies in action.
- Use chart paper to create, as a group, a Venn diagram of the strategies.
- Refer to the Facilitation Strategies tips to ask the group probing questions.

#### **Think and Discuss**

Ask participants to form groups of 3 or 4 teachers. Ask them to consider the different strategies used by the teachers in the video and discuss the approach they prefer. They should also describe the reasons why they prefer that approach.

## **Teacher Reflection Different Approaches**

**Activity Instructions** Each teacher in the video discusses the approach she uses for planning, materials management, and grouping. Identify and record the similarities and differences in their approaches.



**Think and Discuss** Of the two approaches described and observed in the video, explain the one you prefer. Besides personal preference, what other factors affect the approach you use?

### *Extension Activity*

# Creating Effective Materials

In this activity, participants will review the materials created by Cheryl Cetola and Cheryl Souza-Canuel, the classroom teachers seen on the video.

### Creating Effective Instructional Materials

Ms. Cetola and Ms. Souza-Canuel understand that the materials they distribute are as important as the activities they use to teach. Both teachers develop “lesson packets” for lessons that encompass multiple class periods or are unusually complex.

Carefully review the materials they have developed for this lesson and then complete the chart below.

### Activity Instructions

- Direct participants to page X of the guide or make and distribute copies of the student work to each participant.
- Give participants five minutes to review the materials used in the lessons.
- Form groups of three to discuss how the materials address each of the items listed in the left column of the table on the activity worksheet.
- Ask participants to share their responses. If necessary, use the *Facilitation Strategies* tips to direct the conversation.
- Form pairs of teachers of the same grade.
- Ask each pair to choose a lesson topic and activity or set of activities they will use to teach the content.
- Direct participants to consider and record the ways their materials will address the issues listed in the right column of their worksheet pages.
- Ask for participant volunteers to share their activities and material design notes.

### Think and Discuss

As a group, consider and discuss the ways that teachers combine textbook materials and materials that they create. On chart paper, list the issues that drive their decisions to create new materials or use those already available in the textbook. Create a two-column table that compares the features valued in the textbook to those of teacher-created materials. Encourage teachers to share their knowledge of pre-existing materials with one another. Ask them to brainstorm ways to share materials.

**Extension Activity**  
**Creating Effective Materials**

**Activity Instructions** In this activity, you will consider elements of effective teacher-made materials. You will plan one teacher-made material to accompany one of the graduated activities you just planned. This activity refers to the instructional materials used during the video classes, which are located on pages X.

**OUTLINE FOR STUDENT**

Features of Teacher-Made Materials	Development Notes for My Materials
Clearly communicate expectations	Communicate expectations (address how students will know what is expected on each task and how they are to be graded):
Include a process for organizing materials	Organize materials (address how students will keep track of materials, hand them in, etc.):
Provide clear instructions for each task	Instructions will appear _____
Create tools that support learning	Materials will support learning by _____

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**Think and Discuss** Consider your use of textbook materials and teacher-made materials. What drives your decision to use one over the other? How can you share your knowledge of instructional materials with colleagues?

## Author Commentary Plan It!

It is important that participants know what it means to address expectations, create routines, and define procedures. As participants discuss these components, make certain they consider the following ones.

### Communicate Expectations

Students need to know teachers' expectations for their behavior, learning, and outcomes. Teachers should communicate the following expectations for all lessons:

- intended outcomes for the lesson, including proficiency goals (for example: *you will understand the meaning of mitosis*)
- sample of model work (if available)
- expectations for behavior (for example: *you will share in the work load*)

### Create Routines

Routines are defined processes for accomplishing daily or weekly tasks. Establishing familiar routines allows students and teachers to focus on learning goals rather than housekeeping details. Established routines may include

- submitting homework
- forming groups
- collecting and returning lab materials

### Define Procedures

Students need clearly defined procedures for accomplishing labs or hands-on activities. Directions for activities can be delivered a number of ways:

- orally to the whole class and restated by selected students
- written form
- modeled by teacher or student

Addressing procedures in a variety of ways means students of all abilities and language proficiencies will have a clear idea of what steps are required to complete the activity.

## Classroom Lesson

# Finding What Works

As participants share their observations, be certain they identify the following activities.

### Pre-Lab Discussion

Roles and responsibilities are defined and communicated.

### Giving Directions

- Step-by-step directions are given to the whole class.
- Directions are presented using multiple formats, including in writing and spoken aloud.

### Distributing Materials

- Teacher distributes materials prior to the class.
- Teacher distributes materials during activities.
- Students collect materials using the “hopper” technique.

### Managing Groups

- “Round the Clock Learning Buddies” routine (clock-buddy) is used to form pairs: Students identify a potential partner for each hour on a clock (12) and can be asked to pair up with a particular hour of the day any time partners are needed. See page X to see a sample of the worksheet used for this routine.
- Groups of two and four students work together alternately, creating fluid groups.

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## Author Analysis

# Many Purposes

As the workshop addresses the benefits and risks of classroom management, be sure participants consider its effects:

### Effects on Students

- How does classroom management affect learning and student progress with content?
- Can classroom management affect a student’s confidence?
- How can it influence lab safety?
- Does it improve time on task?
- Are students more motivated as a result?
- Does it affect unruly behavior?

### Effects on the Teacher

- Does classroom management improve a teacher’s ability to make progress with content?
- Are teachers more confident?
- Does it affect a teacher’s ability to monitor learning?
- How does it affect teacher control and discipline?
- Does it increase or decrease work load? At what point? (Planning? Delivery?)

### *Teacher Reflection*

# Different Approaches

There are many criteria for selecting classroom management strategies. Participants should consider how the following issues affect their decision making:

- class size
- physical configuration of the classroom
- amount of time available for instruction
- reading and language skill levels in the class
- content focus
- attention span of learners
- science process skills in the class
- need for physical movement

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### *Extension Activity*

## Creating Effective Materials

As participants consider elements of good material design, they should be directed to think about the following guidelines:

#### **Clearly communicate expectations.**

- Students should know how they will be graded.
- Students should understand how activities and aspects of assignments will be weighted.

#### **Include a process for organizing materials.**

- Young students need guidance to keep track of materials.
- Teachers should have a process for turning in homework and other student materials
- Project materials should be kept together to allow students to see relationships between activities and the content they have learned.

#### **Provide clear instructions.**

- Activity instructions should be clear and easy to follow.
- Instructions should be delivered in multiple formats, preferably both in writing and spoken aloud.
- Science activities should present safety information in a consistent and obvious format.

#### **Create materials that support learning.**

- Graphic organizers that support activities, such as writing, help students develop study habits.
- Pictures, diagrams, and tables all improve readability and help students process information in ways that are different from a simple reading of text passages and question-and-answer worksheets.

**Integrating  
Reading/  
Language  
Arts and  
Science**



# ***Integrating Reading/Language Arts and Science***

## **Workshop Focus**

As teachers are asked to incorporate an ever-growing amount of content and skills into their teaching day, they are often pressed to find the time to address everything. The logical solution to this problem is to find a more efficient way to teach all subjects. Fortunately, science instruction is ideally suited to integrating reading/language arts, a critical focus in the elementary grades. This approach allows more efficient use of instructional time. This professional development workshop will help participants identify ways to structure science lessons to include a strong literacy component.

## **Workshop Preview**

This professional development workshop is delivered in segments, most of which are comprised of a video clip and an accompanying activity. The video-based segments include

- **Author Commentary**—Jo Anne Vasquez, Ph.D., a Macmillan/McGraw-Hill science author, discusses key concepts and sets the context for viewing the classroom lesson.
- **Classroom Lesson**—Segments from authentic classroom lessons illustrate key concepts and strategies that participants can use in their classrooms.
- **Author Analysis**—The program author provides thoughtful analysis of the reading/language arts strategies used by the teachers in the classroom lessons.
- **Teacher Reflection**—The teachers of the classroom lessons reflect on the reading/language arts strategies used in the lesson.

Each video segment is accompanied by an activity. The activities in this program include

- **Making Connections**—Identify reading/language arts skills that easily transfer to learning science.
- **A Comprehensive Approach**—Observe classrooms where multiple literacy skills are seamlessly integrated.
- **Best Practices**—Consider the benefits of the strategies used in the classroom lessons.
- **Lesson Outline**—Brainstorm lesson ideas to integrate all areas of reading/language arts into science.

In addition to the four video-based activities, there is one extension activity—**Supporting Writing**—in which participants will consider ways to help students develop writing skill.

## **Facilitation Strategies**

To help you build knowledge of strategies, the *Facilitation Strategies* contains useful information to share with participants. In some cases, suggestions are made for stimulating discussion during activities. We recommend that you read through the section that pertains to each activity prior to beginning.

## **Materials Used in the Video Classrooms**

The lesson plans used for the model classroom lessons appear on page X in the Lesson Materials section at the back of this guide. You are encouraged to refer to these plans throughout the chapter as a tool for understanding the context of the video segments.

Lesson worksheets, materials lists, and sample student work are also included to supplement your viewing experience.

## *Author Commentary* **Making Connections**

In this activity, participants will form pairs to identify reading/language arts skills that parallel skills used in science.

### **Guide to Viewing**

You will watch a short segment in which Jo Anne Vasquez discusses the mutually supportive content areas of reading/language arts and science. As you watch this segment, consider the following questions:

- What kinds of skills transfer from science to reading?
- What is unique about science vocabulary that requires an elementary focus?

### **Activity Instructions**

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Share the Guide to Viewing located on this page with participants.
- Click *Integrating Reading/Language Arts and Science* on the DVD main menu.
- Click *Author Commentary* on the submenu and watch the video segment.
- Discuss as a group the comments Jo Anne Vasquez makes about integrating reading/language arts skills in science.
- Ask participants to form pairs to identify reading/language arts skills that have connections or parallels in science. Have them complete the chart with the skills and connections they identify.
- Have participants share their ideas with the whole group.

### **Think and Discuss**

Jo Anne Vasquez discusses an important rationale for vocabulary instruction in the elementary science lesson. Ask participants to form groups of 3 or 4 teachers of similar grades to consider and discuss her comments about the following issues: What is the role of vocabulary in science? How much time and effort should be exerted toward vocabulary instruction? What techniques are effective for teaching vocabulary?

## **Author Commentary Making Connections**

**Activity Instructions** Jo Anne Vasquez indicates that science and reading/language arts are ideal partners for making learning come alive. Identify four skills found in reading/language arts that have connections to science.

The graphic organizer consists of four stars arranged in two rows. Each star is connected to a rounded rectangular box below it by a vertical line. The stars are labeled "Literacy Skill:" and the boxes are labeled "Connection to Science:". The connections are as follows:

- Top-left star connects to the left box.
- Top-right star connects to the right box.
- Bottom-left star connects to the left box.
- Bottom-right star connects to the right box.

**Think and Discuss** Jo Anne Vasquez identifies vocabulary as a critical issue in the early grades. Discuss her comments and your perspective on the role of vocabulary in science instruction. What is the role of vocabulary in science? How much time and effort should be exerted toward vocabulary instruction? What techniques are effective for teaching vocabulary?

## Classroom Lesson

# A Comprehensive Approach

In this activity, participants will work individually and as a group to identify reading/language arts strategies used in the classroom lessons.

### Guide to Viewing

You will watch excerpts from authentic classroom lessons taught by Cheryl Cetola and Cheryl Souza-Canuel.

Go to page X to read the lesson plan and see student materials.

As you watch this segment, consider the following questions:

- How do these teachers address reading?
- How does Ms. Cetola integrate writing?
- How do hands-on activities reinforce language arts skills?

### Activity Instructions

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Share with participants the Guide to Viewing (located on this page).
- Ask participants to record their observations of how each teacher addresses the skills indicated on their worksheet pages while watching the video.
- Click *Integrating Reading/Language Arts and Science* on the DVD main menu.
- Click *Classroom Lesson* on the submenu and watch the video segment.
- Give 5 to 10 minutes for participants to complete the worksheet, including responding to the reflection prompt.
- Discuss as a group the observations made by participants. Use chart paper to record the strategies that were identified.
- Ask participant volunteers to share an idea or activity they have used to address one of the skills listed.

### Think and Discuss

Ask participants to form groups of 3 to 4 teachers of similar grades and discuss how reading affects the learning of science concepts. What kinds of reading skills do students need to effectively read a science text? Ask participants to come up with three reading strategies related to reading in science that will help students. As a group, have participants share their ideas.

*Classroom Lesson*  
**A Comprehensive Approach**

**Activity Instructions** Each teacher successfully integrates elements of reading/language arts into their lessons. Watch each lesson and record how they address each of the following areas.

**READING**



**WRITING**



**VOCABULARY**



Choose one of the elements above and describe how you have addressed it in your science instruction:

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**Think and Discuss** Consider how reading affects the learning of science concepts. What kinds of reading strategies do students need to effectively read a science text? Identify three reading strategies related to reading in science that will help students. Share your ideas with your group

### *Author Analysis* **Best Practices**

In this activity, participants will explore the benefits of using specific literacy strategies in science.

#### **Guide to Viewing**

You will watch a short segment in which Jo Anne Vasquez, comments on the classroom lessons. As you watch this segment, listen as she details the benefits of integrating reading/language arts in science, including

- vocabulary
- writing
- reading

#### **Activity Instructions**

- Share information from the Facilitation Strategies (located in this section following the activities) prior to beginning this activity.
- Give participants, prior to the playing the video, five minutes to consider and record the benefits of each of the strategies or techniques listed on the workshop activity sheet.
- Share with participants the Guide to Viewing (located on this page).
- Click Integrating Reading/Language Arts and Science on the DVD main menu.
- Click Author Analysis on the submenu and watch the video segment.
- Ask participants to complete the table with Jo Anne Vasquez's comments about the benefits of using these strategies or techniques.
- Discuss as a group Jo Anne Vasquez's comments about the lessons.
- Ask participants whether they agree with her analysis and, if not, have them explain why.

#### **Think and Discuss**

Jo Anne Vasquez discusses the writing tasks seen in the video lessons. On chart paper, create a two-column table. Ask participants to list the kinds of writing structures found or used in science. Record them in the left column. Then, focus participants on describing how writing activities enhance students' understandings of science. Record their main points in the right column.

## Author Analysis Best Practices

**Activity Instructions** Read the three highlighted instructional strategies from the classroom lessons and record the benefits of using each one. Next, listen as Jo Anne Vasquez discusses her observations; record your notes in the right column of the table.

	Strategy Benefits: Your Observations	Strategy Benefits: Jo Anne Vasquez's Observations
Vocabulary Activities		
Graphic Organizers		
Writing Activities		

**Think and Discuss** Jo Anne Vasquez discusses the writing tasks used in these lessons and their benefits to learning. What kinds of writing structures are found in science? How do they help students understand science?

### *Teacher Reflection*

## Lesson Outline

In this activity, participants will outline a lesson that integrates reading/language arts activities in science.

#### **Guide to Viewing**

You will watch a short segment in which each classroom teacher discusses some of the strategies used in the lessons. As you watch, listen for the following comments:

- How do science skills support writing concepts?
- How do incentives affect motivation?

#### **Activity Instructions**

- Share information from the *Facilitation Strategies* (located in this section following the activities) prior to beginning this activity.
- Share with participants the Guide to Viewing (located on this page).
- Click *Integrating Reading/Language Arts and Science* on the DVD main menu.
- Click *Teacher Reflection* on the submenu and watch the video segment.
- Form pairs of teachers of the same grade.
- Ask participant pairs to identify an upcoming science topic they wish to integrate with reading/language arts skills.
- Have participants develop a science lesson outline that includes vocabulary, reading, and writing activities.
- Ask for 3 or 4 volunteers to share the lesson concepts they developed.

#### **Think and Discuss**

Cheryl Cetola describes how she uses bonus point activities to engage students in extended tasks that use integrated skills. Ask participants to form groups of 2 or 3 teachers of similar grades to discuss how they can use literacy activities to motivate students. Ask them to be creative and brainstorm two new activities that will be highly motivating.

## Teacher Reflection Lesson Outline

**Activity Instructions** Now that you have heard the teachers reflect on some of the strategies they use, you will create an outline for a lesson that integrates reading/language arts skills.

Lesson Topic: \_\_\_\_\_

	Video Classroom Lesson	My Lesson
Vocabulary Activities	<ul style="list-style-type: none"> <li>• word sort</li> <li>• connect to prior knowledge</li> <li>• graphic organizer</li> <li>• create a visual picture</li> </ul>	
Reading	<ul style="list-style-type: none"> <li>• partner reading</li> <li>• choral reading</li> <li>• literacy connections (expository, non-fiction selections)</li> </ul>	
Writing	<ul style="list-style-type: none"> <li>• letter writing in partners</li> <li>• compare and contrast paragraph</li> <li>• how-to paragraph</li> <li>• graphic organizer</li> <li>• test item writing</li> </ul>	

**Think and Discuss** Cheryl Cetola uses a writing activity as a “bonus point” task. Describe other ways you can use literacy activities to motivate students. Brainstorm at least two new activities that will be highly motivating to your students.

## *Extension Activity* **Supporting Writing**

In this activity, participants will examine ways to support students in the writing process.

### **Learning How to Write**

Writing is a skill that requires significant practice and guidance to master. The kinds of writing easily transferable to science include the following:

- compare and contrast
- how-to writing
- cause and effect
- observation
- summary

Teachers can help support writing by providing ample practice and guidance.

### **Activity Instructions**

- Direct participants to page X of the guide.
- Ask participants to review the student work, noting the way Ms. Cetola structured the activity.
- Have participants record their observations about how the materials support students' writing skills.
- Form groups of 3 or 4 participants.
- Have participant groups generate ideas for writing activities and methods to support the writing process. (They may use the ideas provided on the workshop activity sheet.)
- Discuss as a group responses to the first prompt on the workshop activity sheet. If necessary, use the Facilitation Strategies tips to direct the conversation.
- Ask participant volunteers to share some of the writing activity ideas they generated.

### **Think and Discuss**

Students' skill in reading and writing can vary greatly within a class. Begin by asking participants to work independently and address the following question: How can you structure a writing activity to allow students of all levels to demonstrate mastery of content? Provide an example of at least one activity. Ask volunteers to share their ideas with the whole group.

## *Extension Activity* **Supporting Writing**

**Activity Instructions** You have seen examples of students using writing skills in science lessons. Students in the elementary grades need instruction and support as they write. In this activity, you will consider the kind of support students need to produce quality writing.

This activity refers to the compare and contrast paragraph and graphic organizer produced in Ms. Cetola's lesson and located on page X.

### **Writing Supports**

- |                              |                      |
|------------------------------|----------------------|
| Venn Diagram                 | Foldable             |
| Two-Column Graphic Organizer | Peer Exchange/Review |
| Model Writing Sample         | Outlining            |

**Activity and Support Offered by Ms. Cetola**

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**Activities and Support I Will Use**

<p><b>Writing Activities:</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p><b>Support I Can Offer:</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
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**Think and Discuss** Students' skill in reading and writing can vary greatly within a class. How can you structure a writing activity to allow students of all levels demonstrate mastery of content? Provide an example of at least one activity. Share it with your workshop group.

## Author Commentary Making Connections

Jo Anne Vasquez mentions one skill that easily transfers to science—sequencing of events—but there are many more. Ask participants to think about the following skills as they identify important ones:

- basic reading skills (strategies such as pre-reading)
- specific reading tasks (reading for information, etc.)
- writing structures
- language fluency and vocabulary
- oral language skills

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### Classroom Lesson A Comprehensive Approach

As participants complete the chart, share any additional strategies that were used in the video that may not have been identified.

<b>Reading</b>	<ul style="list-style-type: none"><li>• partner reading</li><li>• choral reading</li></ul>
<b>Writing</b>	<ul style="list-style-type: none"><li>• letter writing</li><li>• summarizing</li><li>• compare and contrast</li><li>• graphic organizer</li><li>• expository writing</li><li>• note-taking</li><li>• expressing ideas</li></ul>
<b>Vocabulary</b>	<ul style="list-style-type: none"><li>• reference word charts</li><li>• analyze compound words</li><li>• connect to prior knowledge</li><li>• discuss word meaning</li><li>• using science terms in context</li></ul>

## *Author Analysis* **Best Practices**

As the workshop addresses the benefits of techniques and strategies, be sure participants consider the effects on the following instructional elements:

### **Vocabulary Activities**

Vocabulary is essential for students to learn to speak the language of science. Students will recognize terms used in conversation that have different meanings in scientific contexts (consider: the moon waxes, magnetic poles). Students require practice with science vocabulary to use it appropriately.

### **Graphic Organizers**

Students benefit from using a tool to organize science concepts. Graphic organizers require students to take ownership of the content and to categorize and organize ideas that pertain to science. Graphic organizers also help students recall terms and concepts so that they can communicate with and about them.

### **Writing Activities**

Students must learn to effectively explain scientific ideas in order to solidify their understandings of them. Student use their own words to write; when making language choices, they must think through the ideas they wish to communicate. Writing activities can also focus on question writing, which gives students additional opportunities to process learning. A wide variety of writing types can be used in the science lesson.

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## *Teacher Reflection* **Lesson ideas**

As participants develop their lesson ideas, move throughout the room while prompting each group to consider the following questions:

- What materials will be selected to meet the needs of various level readers?
- How can you extend a writing task to meet the needs of more advanced students?
- How will students be grouped?
- How will vocabulary be taught?
- Is there a way to integrate hands-on activities?
- Will all activities occur simultaneously (as in Cheryl Cetola's "stations" approach)?

### *Extension Activity*

# Supporting Writing

Writing skills take time and practice to master. Like reading, students benefit from supports that assist them in the following ways:

- understanding prompts and tasks
- organizing ideas
- structuring paragraphs
- using vocabulary appropriately
- recognizing “good” writing
- practicing writing

Teachers can set up writing tasks to provide the kind of support that students need. Ms. Cetola did so by providing clear directions and expectations, and by requiring students to complete a graphic organizer that helped them compare similar and dissimilar experiences.

# **Video Classroom Lesson Materials**

**THIS IS THE INSIDE BACK COVER  
UNLESS AN ODD NUMBER OF PAGES  
ARE ADDED OR DELETED**