GEORGIA DEPARTMENT OF EDUCATION

Kathy Cox, State Superintendent of Schools

Training for the New Georgia Performance Standards

Days 4 and 5: Designing Instruction

Content Facilitator's Guide
Mathematics 6th Grade

We will lead the nation in improving student achievement.

Acknowledgements

This training program was developed by the Georgia Department of Education as part of a series of professional development opportunities to help teachers increase student achievement through the use of the Georgia Performance Standards.

For more information on this or other GPS training, contact Robin Gower at (404) 463-1933 or rogower@doe.k12.ga.us.

Use of This Guide

The module materials, including a Content Facilitator's Guide, Participant's Guide, PowerPoint Presentation, and supplementary materials, are available to designated trainers throughout the state of Georgia who have successfully completed a Train-the-Trainer course offered through the Georgia Department of Education.

Table of Contents

Overview

Days 4 and 5 Objectives

By the end of day five of training, participants will be able to:

1. Explain why designing instruction is Stage 3 in the standards-based education process
2. Describe the WHERETO method of identifying the purpose of instructional strategies.
3. Identify a variety of instructional strategies for different achievement targets.
4. Develop a balanced instructional plan that includes strategies appropriate to achievement targets and content.
5. Describe how to use a structured, collaborative process for examining student work.
6. Demonstrate how to use teacher commentary to increase student learning.
7. Explain different ways of curriculum mapping.

Module Sequence

Prior Preparation—Participants
- Unpack several standards to create Stages 1 and 2 for a unit of study

Introduction to Stage 3 (2 hours)
- Quotation Hook
- Review of Stages 1 and 2
- Overview of Stage 3
- Matching Strategies to Achievement Targets

Designing an Instructional Unit (6 hours)
- Hook Activity
- GRASPS Review
- Instructional Strategies
- Constructing a Learning Plan
- Designing Units Using Concept Mapping
- Designing Another Unit

Examining Student Work (2 hours)
- Collaborating to Improve the Quality of Student Work
- Developing Useful Teacher Commentary

Curriculum Mapping (1 hour)
- Basic Principles for Curriculum Mapping
- Creating a Sample Map

Module Materials for Days 4 and 5 of Training

Content Facilitator's Kit contents:

- Content Facilitator's Guide (one for each leader)
- Complete set of slide transparencies (PowerPoint)
- Participant's Guide (one per participant and one per leader)
- Sample unit plan that includes unpacked standards and assessment plan.
- Sample tasks and student work

Other materials needed:

- Name tags
- Easel chart paper and stand
- A number of colored markers for flipchart
- Post-it Notes
- Masking tape to post flipcharts
- Highlighter markers, one per participants
- Scissors
- Cylinders (model or paper towel rolls)

Equipment:

- Overhead projector or computer and LCD projector

Resources: Each participant should have the following resource materials.

A. Participant's Guide

B. Wiggins, Grant, and Jay McTighe. *Understanding by Design Professional Development Workbook.* Association for Supervision and Curriculum Development. 2004. Pages 214 – 225. (Participant's should bring this resource to the training.)

C. Sample task and student work

D. Sample Curriculum Maps (see note on page 69)

Day 3 Follow Up/Days 4 and 5 Preparation

Remind participants to complete the Day 3 follow-up assignment as preparation for Days 4 and 5. Also remind participants to bring the *Understanding by Design* workbook, as well as their notebooks from Days 1 through 3 of training.

Recommended Readings/Viewings: Instruction

Note: A more general list of resources for the standards-based education process is contained in the materials for Day one of training.

Examining Student Work. Alexandria, VA: ASCD, 2002.

This excellent resource includes four VHS tapes and a Facilitator's Guide that thoroughly illustrate a number of collaboration protocols for examining student work in order to improve student achievement. One set of these materials is being sent to each local system.

Hayes Jacobs, Heidi. *Mapping the Big Picture: Integrating Curriculum and Assessment K-12*. Alexandria, VA: ASCD, 1997.

In this step-by-step description of the process for creating and working with curriculum "essential questions," as well as assessment design that reflects what teachers know about the students they teach. The benefits of this kind of mapping are obvious for integrating curriculum. Through the development of curriculum maps, educators can see not only where subjects already come together but also any gaps that may be present.

Literacy Across the Curriculum: Setting and Implementing Goals for Grades Six through Twelve. SREB, 2004.

This volume is essential for state, district, and school leaders who plan to implement school wide literacy programs. It provides concrete, research-based steps not only to raise reading and writing achievement but also to help students learn more in every class by using literacy skills. The guide focuses on five literacy goals: reading 25 books across the curriculum; writing weekly in all classes; using reading and writing strategies; writing research papers; and taking rigorous language arts classes.

Marzano, Robert J., Debra J. Pickering, and Jane E. Pollock. *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement*. Alexandria, VA: ASCD, 2001.

Using a meta-analysis of thousands of research studies, Marzano, et al., clearly answer the question, "Which instructional techniques are *proven* to work?" They provide 13 proven strategies that all teachers can use, and they explain the research in a clear, practical manner.

Marzano, R., et al. *A Handbook for Classroom Instruction That Works*. Alexandria, VA: ASCD, 2001.

A perfect resource for self-help or school study groups, this handbook makes it much easier to apply the teaching practices outlined in *Classroom Instruction That Works*. The authors guide the reader through the nine categories of instructional strategies that are most likely to maximize student achievement and provide everything needed to use the strategies quickly in classrooms. The book includes the following: exercises to check understanding; brief questionnaires to reflect on current beliefs and practices; tips and recommendations to implement the strategies; samples, worksheets, and other tools to help plan classroom activities; and rubrics to assess the effectiveness of the strategies with students.

Marzano, Robert J. *Classroom Management That Works: Research-Based Strategies for Every Teacher*. Alexandria, VA: ASCD, 2003.

The authors analyze research from more than 100 studies on classroom management to answer the questions, "How does classroom management affect student achievement?" and "What techniques do teachers find most effective?" The authors provide action steps, along with real stories of teachers and students, to guide teachers in implementing the research findings.

Strong, R., H. Silver, and M. Perini. *Teaching What Matters Most: Standards and Strategies for Raising Student Achievement*. Alexandria, VA: ASCD, 2001.

This practical book about the responsibility educators have to teach what matters most includes many examples of educators throughout the nation who have been successful in increasing student performance on state and national assessments. The authors also explore three changes that must take place to achieve this goal: responsible standards, responsible strategies, and responsible assessment practices.

Wiggins, Grant, and Jay McTighe. *Understanding by Design*. Alexandria, VA: ASCD, 1998.

This book explains the "backward design" process that is the backbone of standards based education. The book explains both the underlying principles and the process teachers can use to put them into practice.

Wiggins, Grant, and Jay McTighe. *Understanding by Design Study Guide*. Alexandria, VA: ASCD, 2000.

This companion book to *Understanding by Design* provides discussion questions, graphic organizers, and summaries to support faculty study groups that are exploring *Understanding by Design*.

Wiggins, Grant, and Jay McTighe. *Understanding by Design Professional Development Workbook*. Alexandria, VA: ASCD, 2004.

This companion book to *Understanding by Design* is chock-full of templates and examples to help teachers put the process into place.

Suggested Web Sites for Instruction

http://ims.ode.state.oh.us/ODE/IMS/Lessons/Default.asp

This web site, created by the Ohio Department of Education, provides guidelines for planning standards-based instruction and for designing standards-based units and lessons.

http://pareonline.net

Practical Assessment, Research and Evaluation (PARE) is an on-line journal supported, in part, by the Department of Measurement, Statistics, and Evaluation at the University of Maryland. Its purpose is to provide education professionals access to refereed articles that can have a positive impact on assessment, research, evaluation, and teaching practice.

http://users.edte.utwente.nl/lanzing/cm_home.htm

This web site provides an overview of concept mapping that might be useful for determining those concepts and processes that fit together for units of instruction.

http://www.greece.k12.ny.us/instruction/ela/6-12/BackwardDesign/Overview.htm

This page on the Greece Central School District of New York web site offers multiple resources related to instructional planning using the Standards-Based Education process.

http://www.greece.k12.ny.us/instruction/ela/6-12/Curriculum%20Mapping/Index.htm

This page on the Greece Central School District of New York web site offers multiple templates that can be modified and used to assist in mapping concepts into units of instruction.

http://www.lkwash.wednet.edu/lwsd/html/programs/curriculum/modelunits_t.asp

This web site published by the Lake Washington School District includes a sample planning guide, a unit planning template, and several sample unit plans. GPS need to be unpacked through stages 1 and 2 before employing these templates.

http://www.learn-line.nrw.de/angebote/greenline/lernen/downloads/nine.pdf

This article lists, explains, and provides examples of nine instructional strategies, identified by Marzano, Pickering, and Pollock, that improve student achievement across all content areas and grade levels.

http://www.pbs.org/pbsyou/about.html

This PBS web site provides information about free televised, adult education courses in everything from dramatic literature to cooking. Anyone teaching a new course or just wanting to revisit particular content topics might find this site useful.

http://www.rmcdenver.com/useguide/lessons/examples.htm?

This site provides sample lessons/units based on the Texas state standards.

http://www.sasked.gov.sk.ca/docs/policy/approach/instrapp05.html

This excellent article from Curriculum and Instruction Branch Saskatchewan Education, 2220 College Avenue, Regina, Saskatchewan, provides information teachers may find helpful about matching instructional strategies to desired learning goals.

http://64.233.179.104/search?q=cache:FWPY3QS1C6wJ:www.pls.uni.edu/tws/rubricsamples/IDM2.pdf+Making+Instructional+Decisions&hl=en

This web site provides two anecdotal examples of teachers using assessment of student learning to make instructional decisions.

http://www.techtrekers.com/

This site provides information about simulations, web quests, and other strategies and activities that can provide students with the opportunity to learn.

www.pals.sri.com

PALS is an on-line, standards-based, continually updated resource bank of science performance tasks indexed via the National Science Education Standards (NSES) and various other standards frameworks.

www.teachersbridge.org

This excellent site, created by a consortium of Georgia educators and other professionals in education, provides teaching resources, online learning communities, and much more.

http://www.sasked.gov.sk.ca/docs/policy/approach/instrapp02.html

This article provides an overview of four foundations for instructional decision making, as well as information on appropriate teacher reflection about the practice of instructional decision making in the classroom.

Agenda

This is a two-day course, with approximately 11 hours of instructional time.

Prior Preparation—Participants

- Unpack several standards to create Stages 1 and 2 for a unit of study

Introduction to Stage 3 .... 2 hours

- Quotation Hook
- Review of Stages 1 and 2
- Overview of the Training
- Overview of Stage 3
- Matching Strategies to Achievement Targets

Designing an Instructional Unit .... 6 hours

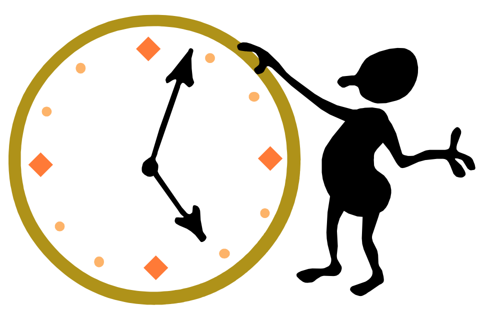
- Hook Activity
- Evaluating an Instructional Plan
- Selecting Appropriate and Balanced Instructional Strategies for a Unit

Examining Student Work .... 2 hours

- Collaborating to Improve the Quality of Student Work
- Developing Useful Teacher Commentary

Curriculum Mapping .... 1 hour

- Basic Principles of Curriculum Mapping
- Creating a Sample Map



Introduction to Stage 3

Time 2 hours

Overview In the introduction, the participants review key points from stages one and two in the standards-based education process. Then, the group investigates the purpose of Stage 3 and the WHERETO acronym, which describes the purposes of various instructional strategies.

Objectives

- Explain why instruction is Stage 3 in the standards-based education process.
- Describe the WHERETO method of identifying the purposes and uses of instructional strategies.
- Identify a variety of instructional strategies for different achievement targets

Activities

- Quotation Hook Activity
- Review of Stages 1 and 2
- Overview of the Training
- Overview of Stage 3
- Matching Strategies to Achievement Targets

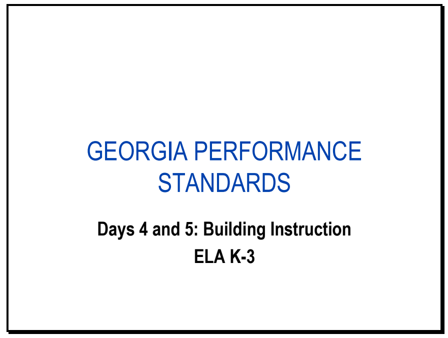
Materials

- Overhead projector or computer and LCD projector
- Transparencies or PowerPoint presentation
- Participant's Guide
- Agenda flipchart (create before class)
- Parking Lot flipchart (create before class)
- Pages 214 – 225 in the UbD Professional Development Workbook

Quotation Hook Activity

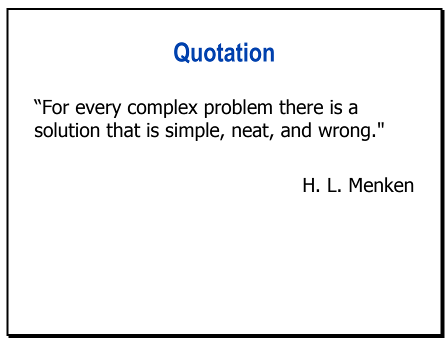
Title Slide

1. Show title slide and welcome participants to training.



Slide: *Quotation*

2. Show slide, *H. L. Menken Quotation.*



3. Present:

   - **This statement by writer and philosopher H. L. Menken was referenced the other day on an early morning radio program, but it seems *à propos* as we begin Days 4 and 5.**

   - **Keeping this quotation in mind, take a minute or two in your table groups to reflect on the GPS training—from where we started in the fall to where we are today. How does Menken's aphorism relate to the implementation of the Georgia Performance Standards?**

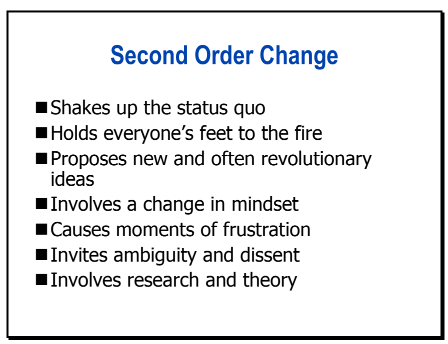
4. Allow participants a couple of minutes to discuss at their tables, then ask: **What do you think? Does Menken provide any insights for us?** Expect (or work to elicit) comments such as:

   - The new GPS are very complex
   - Implementing the GPS is a complex process
   - We can't expect to accomplish this complex task without effort
   - There are no "quick fixes" to unpacking the GPS, developing assessments, or planning units of instruction.

5. Present: **In his discussion of *What Works in Schools*, Bob Marzano discusses two types of change that occurs in schools: First Order Change and Second Order Change. First Order Change involves those things that make our lives easier or make us feel better about ourselves, our schools, our jobs, etc. Eliminating those annoying interruptions during class time might be an example of a First Order Change. But Second Order Change is very different.**

Slide: *Second Order Change*

6. Show slide, *Second Order Change.* Reveal each bulleted point one at a time as you present the following information:



   - **Second Order Change isn't easily "implemented"—does that word sound familiar! Second Order Change necessitates a change in mindset; it takes time and effort and often causes periods of frustration. Second Order Change isn't easy, but as Marzano's work illustrates, it is Second Order Change that leads to improved student achievement, our goal in Georgia.**

- **We've all experienced moments of frustration as we've gone through this process leading up to the implementation of the GPS, and it's important to remember that we will have more of these moments. But achieving our goal of improving student achievement is worth it.**

- **To put everything back into the context of Menken's aphorism, implementing the GPS is a "complex" process. No "simple and neat" solution to this process exists; and if we attempt to address this "complex" process with "a simple and neat" solution, we run the risk of reducing the Second Order Change to a First Order Change, something that may make us feel better and/or alleviate our moments of frustration but at the potential cost of any real and substantive change; and that wouldn't be the right solution to this complex problem.**

- **Before we begin today, let's take a second and pat ourselves on the back. We've come a long way since Day 1 of GPS training. With each subsequent day of training, we've moved closer to our goal of implementing the Georgia Performance Standards in order to improve student achievement; and with each day of training we've all become less anxious and more confident about what we're doing. These feelings of increased confidence will continue in these final two days of training for this academic year, but we shouldn't become discouraged if we still have difficult moments. If there are no difficult moments, we aren't really attempting Second Order Change.**

- **As part of this training today and tomorrow, we will spend time discussing the importance of collaboration. The process of standards-based education does not end with the GPS training. Nor will it end as we implement the GPS next year. The second unit of instruction that we design will be better than the first. And we will become better and better at utilizing the standards-based education process and the Georgia Performance Standards each year. By supporting each other as we experience this Second Order Change, by working together and collaborating in our schools, our systems, our regions, and throughout the state, we can lead the nation in improving student achievement.**

7. Transition: **To begin today, we will briefly review the first two stages of the standards-based education process.**

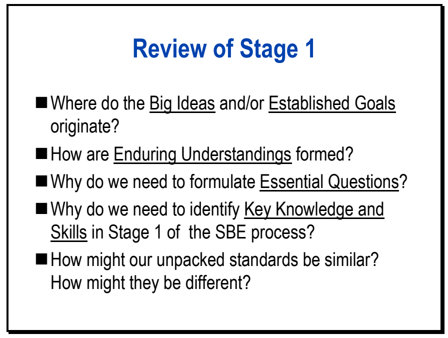
Review of Stages 1 and 2

1. Refer participants to *GPS and the Standards-Based Education Process,* on page 6 in their Participant's Guides. Say: **In our previous workshops, we worked extensively on understanding and applying Stages 1 and 2. In this workshop, we're going to focus on Stage 3.**

2. Discuss: **We're going to discuss instruction shortly, but first, I'd like you to recall key points from Stages 1 and 2.**

Slide: *Review of Stage 1*

3. Show slide, *Review of Stage 1*. Present: **The purpose of this activity is for you to think critically about Stages 1 and 2 in the standards-based education process**.

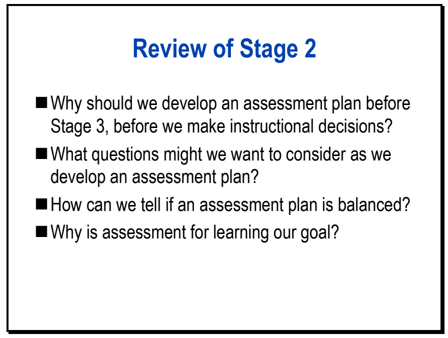


4. Ask each question on this slide and allow participants time to share responses before going on to the next question. Answers will vary, but expect and/or elicit such responses as

   - The Big Ideas/Established Goals are in the standards themselves,
   - Enduring understandings are formed by grouping or relating core concepts and processes specified in the standards, either explicitly or implicitly; but these understandings specify the kinds of conceptual learning that students will retain beyond the unit and the course,
   - By using a variety of modalities to answer essential questions via different tasks, activities, and/or assessments, students will provide evidence of learning,
   - The knowledge and skill statements specify what students need to know and be able to do in order to provide evidence of learning, so this helps teachers design appropriate assessments in Stage 2,
   - The core concepts and processes are consistent because they are specified in the standards, so our unpacked standards should be similar, if not identical in terms of the big ideas and established goals that we determine; however, because these core concepts and processes may be combined differently in different units, the standards we unpack for a unit may look different.

Slide: *Review of Stage 2*

5. Show slide, *Review of Stage 2.* Ask each question on this slide and allow participants time to share responses before going on to the next question. Answers will vary, but expect and/or elicit such responses as:



- We need to determine the assessments that will provide the best and most complete evidence of the desired learning goals from Stage 1 before we can plan the tasks and activities that will provide students with the best and most effective opportunities to learn.
- What learning goals have we determined for this unit? What are our achievement targets? Will this assessment generate evidence of learning appropriate to this achievement target? Is this the best assessment format for this achievement target? Will this assessment plan allow multiple opportunities for students to provide evidence of learning? Will students be able to use different modalities to provide evidence of learning?
- We can work to achieve balance in assessment by predetermining a list of assessment formats to include throughout the course and using this list as a preparation guide, and by working collaboratively with other teachers to evaluate our assessment plans.
- Classroom assessment for learning allows us to use assessment to guide instruction and to obtain a complete and ongoing record of student growth so that we can intervene whenever necessary in order to provide students with more practice, remediation, extension, or alternate means of understanding.

6. Present: We also need to recall that:

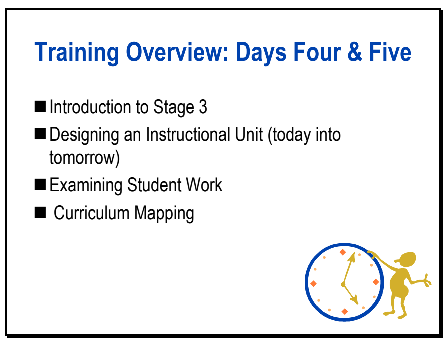
   - **The Georgia Performance Standards provide year-long learning goals.**
   - **Units of study typically involve multiple standards and elements, and many standards and elements will be addressed throughout a grade or course.**
   - **Units of study often take weeks to complete; and During that time students should demonstrate growing levels of competence.**

7. Transition: **Now that we have recalled our prior knowledge, let's look at what this workshop holds** for us.

Overview of the Training

Slide, *Training Overview: Days 4 and 5*

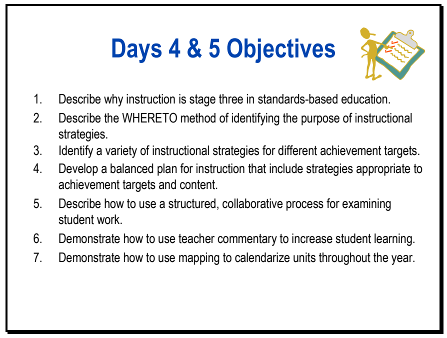
1. Show slide, *Training Overview: Days 4 and 5*. Present:



   - **First, we're going to look at an overview of Stage 3 and the WHERETO acronym, which address the purposes of various instructional strategies.**
   - **The second section, *Designing an Instructional Unit,* forms the heart of this workshop, and will take the majority of our time. In it, we'll focus on how to select and design a balance of instructional activities, in much the same way as we looked at balanced assessment. In this section, you'll work on applying what you learn in order to design a unit of instruction.**
   - **Tomorrow, we'll look at *Examining Student Work,* a process for improving both teaching and learning.**
   - **We'll conclude with a discussion of some different ways of mapping curriculum.**

Slide, *Days 4 & 5 Objectives*

2. Show slide, *Days 4 & 5 Objectives.*



PG-5
Learning Journal

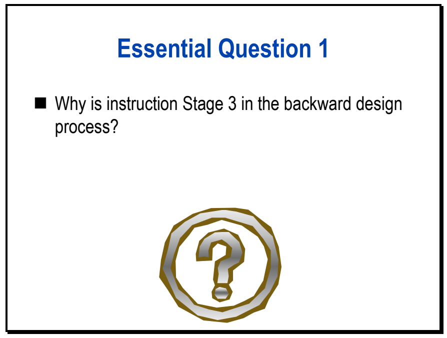
3. Ask participants to read the objectives (also contained on page 5 in their Participant's Guides) and jot down one specific thing that they hope to get from the workshop. Suggest that they refer back to this before leaving at the end of Day 5.

4. Ask: Are there any questions about the overview for Days 4 and 5?

Previewing Stage 3

Slide, *Essential Question 1*

1. Show slide, *Essential Question 1.* Present: **This is the first question we'll be answering. You probably already have a good idea of the answer**.



2. Ask: **What is Stage 3 in standards-based education?**

   - Making instructional decisions

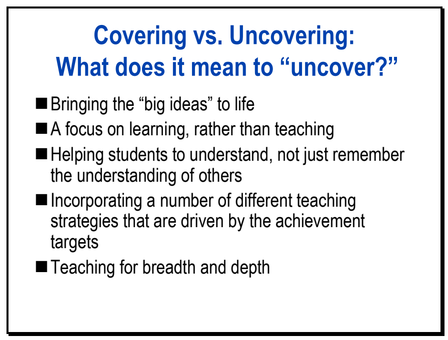
3. Ask: **Why does this stage follow unpacking and assessment?**

   - By getting a clear picture of the standards/elements and the evidence required, we can better plan our instruction to ensure that every student is given the opportunity to achieve the learning goals.

4. Present: **As we work to implement the new GPS, teachers, administrators, and other stakeholders often want to know how they can manage to "get through everything." Wiggins and McTighe acknowledge that teachers often worry about "covering" all the material, but they suggest that rather than thinking in terms of "covering" the material, we should focus on "uncovering." What does this mean to you?**

Slide, *Uncovering vs. Covering*

- See slide, *Covering vs. Uncovering: What does it mean to "uncover"?* for sample answers.

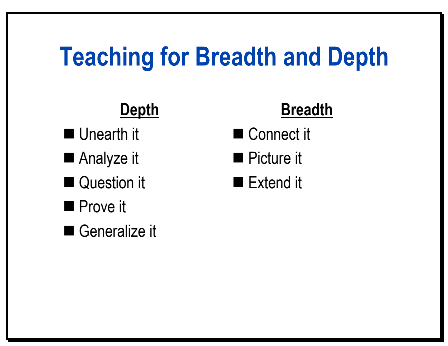


Slide, *Teaching for Breadth and Depth*

5. Ask: **Wiggins and McTighe also advocate teaching for depth and for breadth. What does this mean to you?**

PG-7

- See slide, *Teaching for Breadth and Depth* for sample answers.
- Explain that more information on each of these points is contained on page 7 in the Participant's Guide.



Teaching for Breadth and Depth (PG-7)

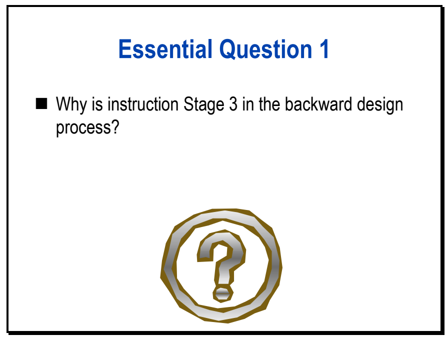
For Depth	Breadth
Unearth it ➢ Make assumptions explicit ➢ Clarify points of view ➢ Bring light to the subtle, the misunderstood, the not obvious, the controversial, the obscure, the problematic, the missing, and the lost *Analyze it* ➢ Separate into parts ➢ Inspect and examine ➢ Dissect, refine, and qualify *Question it* ➢ Test ➢ Challenge ➢ Doubt ➢ Critique *Prove it* ➢ Argue ➢ Support ➢ Verify ➢ Justify *Generalize it* ➢ Subsume specifics under a more encompassing idea ➢ Compare and contrast	*Connect it* ➢ Link discrete and diverse ideas, facts, and experiences *Picture it* ➢ Make concrete and simple ➢ Represent or model in different ways *Extend it* ➢ Go beyond the given to implications ➢ Imagine "what if?"

Adapted from Wiggins, Grant, and Jay McTighe. *Understanding by Design.* ASCD. 1998. 102.

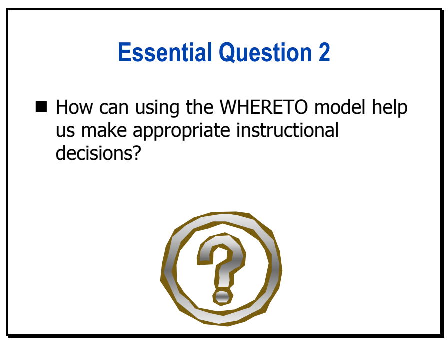
6. Present: **As you can see, designing instruction that allows students to "uncover" the depth of a topic or concept in order to reach understanding involves a number of different kinds of strategies.**

Slide, *Essential Question 1*

7. Show slide, *Essential Question 1.* Ask participants for any additional responses to this question.

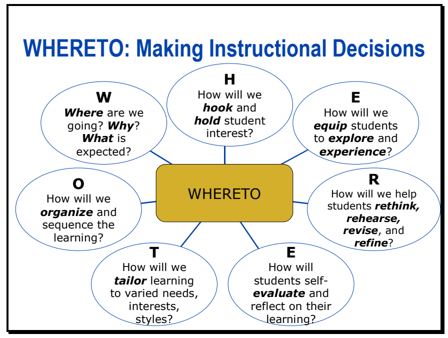


8. Show slide, *Essential Question 2.*



9. Present: **Let's consider one more model as we start to make decisions about instruction. This is the WHERETO model**.

10. Show slide, *WHERETO: Making Instructional Decisions.* Present: **This model provides some questions that we can use as we begin to consider appropriate instructional strategies for a unit.**



11. Ask: **What is the value of using WHERETO?**

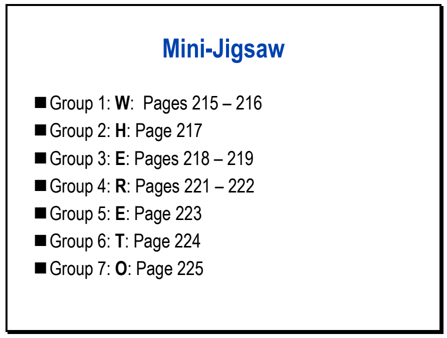
    - It keeps us mindful of the criteria we hope to address through various learning tasks and activities.
    - It focuses on student learning and all that entails: engaging the students, designing instruction to meet the needs of the students, and encouraging students to become independent learners. In other words, even when the teacher is making the instructional decisions, the focus is on the student.

12. Present: **We're going to use a mini-jigsaw activity to explore the WHERETO model. By "mini," I mean that both the readings and the time will be very short. I'd like you to get a better idea of what each of the letters in the WHERETO model encompasses**.

13. Ask participants to count off by sevens and then form seven groups.

Slide, *Mini-Jigsaw*

14. Show slide, *Mini-Jigsaw.* Present: **Each group will focus on just one or two pages describing the WHERETO model. The pages assigned to each group are listed on this slide. I'd like you to take ten minutes to read and discuss the page or pages, and then present a one-minute summary of the information**.



15. Ask each group to choose a recorder and a speaker.

Pages 214 – 225 of the UbD Professional Development Workbook

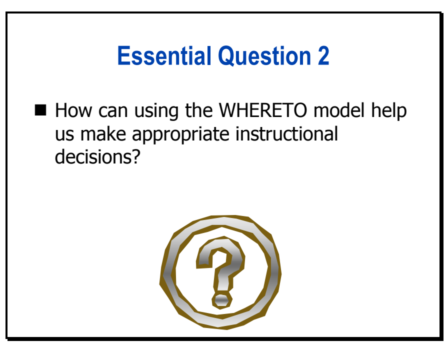
16. Ask the participants to turn to the designated pages in the UbD Professional Development Workbook.

17. Allow ten minutes for small group work. Provide two- and one-minute warnings.

18. Ask each group to present a one-minute summary.

Slide, *Essential Question 2*

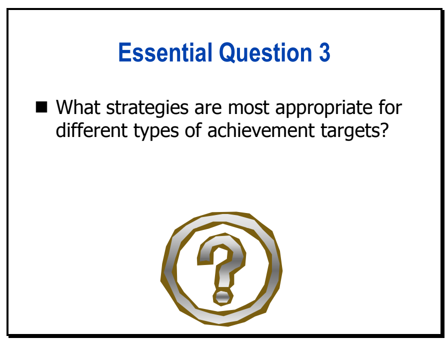
19. Show slide, *Essential Question 2,* and ask participants to share their responses.



20. Transition: **The WHERETO model applies to all the various types of achievement targets (Knowledge/ Information, Skills/Processes, Thinking & Reasoning, and Communication) that we discussed in earlier workshops. However, additional questions need to be considered to ensure that the strategies you use are appropriate for the achievement targets**.

Slide, *Essential Question 3*

21. Show slide, *Essential Question 3*. Explain: **In Day 3 of training, we matched assessment formats to different achievement targets in order to determine the most effective means of obtaining appropriate and meaningful evidence of student learning. Today we will use a similar process to match instructional strategies to achievement targets.**



Slide, *Matching Strategies to Achievement Targets*

PG-8

22. Show slide, *Matching Strategies to Achievement Targets.* Refer to the general types of strategies listed across the top of the chart and say:

    - ➢ **This slide is very similar to the one we used to match assessment formats to achievement targets. As you can see, the achievement targets in the first column are exactly the same.**
    - ➢ **If you look across the first row, however, you'll see five categories of instructional strategies listed.**
    - ➢ **For our training purposes, we will be using five categories of instructional strategies—direct instruction, experiential learning, independent learning, indirect instruction, and interactive learning—but there's no single correct way of categorizing instructional strategies. You may choose to categorize differently in your school or system.**
    - ➢ **Placing different instructional strategies into categories can, however, help ensure that we select the best types of strategies for particular achievement targets.**

Matching Strategies to Achievement Targets

Achievement Target	Direct Instruction	Experiential Learning	Independent Learning	Indirect Instruction	Interactive Instruction
Knowledge/ Information					
Skills/ Processes					
Thinking & Reasoning					
Communi- cation					

PG-8

23. Ask participants to turn to page 8 in the Participant'sGuide.

General Categories of Instructional Strategies (PG-8)

Direct Instruction: Instructional strategies that involve a high degree of teacher control.

Compare & Contrast
Cues, Questions, & Advance Organizers*
Demonstrations
Didactic Questions
Drill and Practice
Explicit Teaching
Graphic Organizers
Guides for Reading, Listening, Viewing
Identifying Similarities and Differences*
Mastery Lecture
Reinforcing Effort & Providing Recognition*
Setting Objectives & Providing Feedback*
Summarizing & Note Taking*
Structured Overview

Experiential Learning: Instructional strategies where students learn by doing or experiencing authentic or simulated situations.

Conducting Experiments
Field Observations
Field Trips
Model Building
Surveys
Modeling
Nonlinguistic Representations*
Role Playing
Games
Simulations
Synectics

Independent Learning: Instructional strategies during which students work independently, sometimes at their own rate on self-selected assignments or topics.

Assigned Questions
Computer Assisted Instruction
Correspondence Lessons
Essays
Graphic Organizers
Homework and Practice*
Learning Activity Package
Learning Centers
Learning Contracts
Reports
Research Projects
Summarizing and Note Taking*

Indirect Instruction: Instructional strategies where the teacher establishes the learning situation or task, but the students determine the direction and/or solution.

Case Studies
Concept Attainment
Concept Formation
Concept Mapping
Cloze Procedures
Generating & Testing Hypotheses*
Graphic Organizers
Inquiry
Problem Solving
Reading for Meaning
Reciprocal Teaching
Reflective Discussion

Interactive Instruction: Instructional strategies that involve students working with other students and/or the teacher to move toward the learning goals.

Brainstorming
Circle of Knowledge
Cooperative Learning*
Debates
Interviewing
Laboratory Groups
Panels
Peer Practice
Problem Solving
Role Playing
Socratic Seminars
Tutorial Groups

* Marzano, Pickering, and Pollock note that incorporating these nine strategies into instruction can improve student achievement across all content areas and grade levels. http://www.learn-line.nrw.de/angebote/greenline/lernen/downloads/nine.pdf

24. Present:
    - **As you read over the different categories with their lists of instructional strategies, mark those that you use frequently with a plus (+), those that you use sometimes with a checkmark (✓), and those that you use rarely or never with a minus (-).**

25. Allow participants a few minutes to read over the list of instructional strategies, then say:

    - **Now look over your marked list. What does this tell you about your classroom practice?**
    - **How might you use this list as you make instructional decisions?**

26. Allow participants to share responses, then say:
    - **It's not enough, though, merely to pick instructional strategies from a list; we need to make sure that we're using the best strategies for particular achievement targets.**

27. Ask participants to close their Participant's Guide.

    Trainer's Note: *The reason that the Participant's Guides should be closed is that key points in the discussion that follows are summarized in the Participant's Guide, and we want participants to think about and discuss them, rather than just reading from the guide.*

Four slides on matching strategies to achievement targets

28. Show the four slides that correspond to the five types of achievement targets. For each one, refer to the instructional strategy category and ask, "Would this type of strategy be appropriate for this achievement target?" After discussion, click on the slide to reveal the contents of each table cell in turn.

    Trainer's Note: *The slides are set up to reveal the contents of each cell in turn, upon a mouse click (or other method of slide advancement).*

29. Say: **Responses other than those on the chart may be just as appropriate, or perhaps even more appropriate to particular teaching and learning situations. Furthermore, different strategies within a particular category may be more or less appropriate to a given situation; but it's important that we always examine the appropriateness of the instructional strategies for particular achievement targets.**

Achievement Target: Knowledge and Information

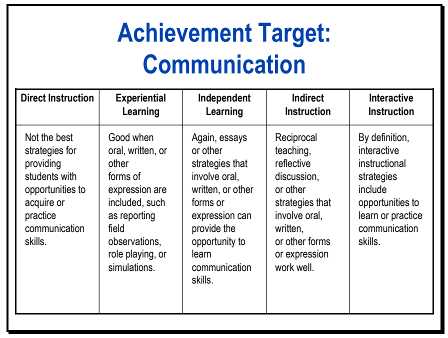
Direct Instruction	Experiential Learning	Independent Learning	Indirect Instruction	Interactive Instruction
Strategies such as direct instruction, graphic organizers, structured overview, etc., can convey facts or information to students.	Experiential strategies may be structured to allow students to arrive, inductively or deductively, at rules or principles.	Strategies such as assigned questions, learning activity packages or centers, reports, or research projects allow students to obtain facts, etc.	Strategies such as concept attainment or concept formation, reading for meaning, reciprocal teaching, and inquiry allow students to arrive at rules or principles.	Strategies such as discussion, interviewing, or tutorial groups can provide students with information or help them to review rules, etc.

Achievement Target: Skills/Processes

Direct Instruction	Experiential Learning	Independent Learning	Indirect Instruction	Interactive Instruction
Modeling can introduce or demonstrate skills or processes, but other, more student-directed strategies are needed as well.	Modeling, games, conducting experiments, etc., can introduce skills/processes or provide practice.	Essays, learning activity packages or centers, or research projects, etc., can provide opportunities for application or practice.	Instructional strategies that involve problem solving often provide the opportunity to acquire skills or practice processes.	Cooperative learning groups, debates, role playing, or laboratory groups, etc., work well.

Achievement Target: Thinking and Reasoning

Direct Instruction	Experiential Learning	Independent Learning	Indirect Instruction	Interactive Instruction
Modeling can introduce or demonstrate thinking and reasoning processes, but other, more student-directed strategies are needed as well.	Most experiential strategies work well here, especially roll playing, games, experiments, and simulations.	Some, such as certain essay topics, learning activity packages or centers, or research projects, work better than others.	Strategies such as working with case studies, concept mapping, inquiry, problem solving, etc., work well with thinking and reasoning targets.	Most interactive instructional strategies work with these targets, but especially problem solving and Socratic Seminars.



Achievement Target: Communication

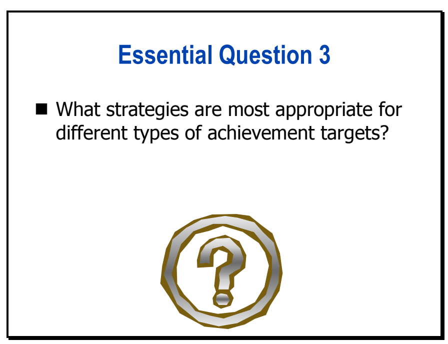
Direct Instruction	Experiential Learning	Independent Learning	Indirect Instruction	Interactive Instruction
Not the best strategies for providing students with opportunities to acquire or practice communication skills.	Good when oral, written, or other forms of expression are included, such as reporting field observations, role playing, or simulations.	Again, essays or other strategies that involve oral, written, or other forms or expression can provide the opportunity to learn communication skills.	Reciprocal teaching, reflective discussion, or other strategies that involve oral, written, or other forms or expression work well.	By definition, interactive instructional strategies include opportunities to learn or practice communication skills.

Matching Strategies to Achievement Targets

1. Present: **We've looked at a range of issues related to choosing appropriate instructional strategies:**

   - **The learning goals and the types of evidence we want to obtain**
   - **The importance of WHERETO (having a range of strategies for getting attention, focusing the learning, facilitating learning, differentiating instruction, and providing for practice and feedback)**
   - **The need to match strategies to different achievement targets**

2. Show slide, *Essential Question 3*, and ask participants for any final reflections on this question.



3. Transition:

   - **In the next section of the training, we're going to look more in-depth at developing instructional strategies for a unit and put our learning to work by making some instructional decisions for particular units.**

Designing an Instructional Unit

Time 6 hours (extending to second day)

Overview In this section, participants will focus on applying what they've learned in the first section. They will model strategies and complete a template for a unit.

Objective

- Given a unit plan with Stages 1 and 2 completed, develop a balanced plan for instruction that include strategies appropriate to achievement targets and content.

Activities

- Hook Activity
- GRASPS Review
- Instructional Strategies
- Constructing a Learning Plan
- Designing Units Using Concept Mapping
- Designing Another Unit

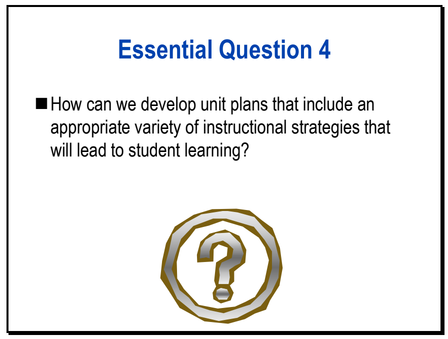
Materials

- Cylinder
- Centimeter graph paper
- Tape
- Chart paper
- Transparencies or PowerPoint presentation
- Markers
- Scissors
- Concept cards (see cards at the very end of this guide; copy and cut out each sheet)

Hook Activity (1 hour, 15 minutes)

Slide: *Essential Question 4*

1. Show slide *Essential Question 4.* Present: **We will work on answering this question for the rest for the day today and tomorrow morning**.



PG-10

2. Refer participants to the *Georgia Mathematics Standards: Grade 6*, which begin on page 10 in their Participant's Guide. Explain: **You will be referring to these standards throughout this unit, so I just want to point out their location to you now. You don't need to do anything right now.**

PG-17

3. Explain: **It is important for a teacher to select tasks that fit the goals of his/her unit. In this activity, the unit we will consider is the one on surface area that we have been working on throughout this training. The task we will do appears to fit this unit. We will actually do the task and then analyze it mathematically and instructionally to see if it fits our unit.**

PG-16
Centimeter Paper

4. Refer participants to the *GPS Mathematics Grade 6 Sample Task* on page 16 in their Participant's Guides. Note also that there is centimeter paper on the last two pages of their Participant's Guides.

GPS Mathematics Grade 6 Sample Task

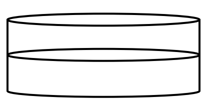
a) Explain what is meant by surface area. What steps would you take to find the surface area of a cylinder?

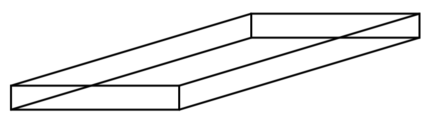
b) One of the major expenses in manufacturing a can is the amount of metal that goes into it. How many square centimeters of metal would be required to manufacture a can that has a diameter of 8 cm and a height of 20 cm? Estimate and then solve.

c) Draw a net (pattern) for the manufacturer to use to make the can.

d) Use your work in parts a – c to write a rule in words for finding the surface area of a cylinder. Now write your rule using letters, numbers, and mathematical symbols (a formula).

e) Michael bakes a round two-layer birthday cake that is to be covered with frosting on the top, sides, and in between the layers. Each layer has a height of 4 cm and diameter of 24 cm. The label on the can of frosting he bought claims that the contents will cover the top and sides of a one-layer rectangular sheet cake that is 32 cm by 22 cm by 4 cm. Will Michael have enough frosting? Show how you know.

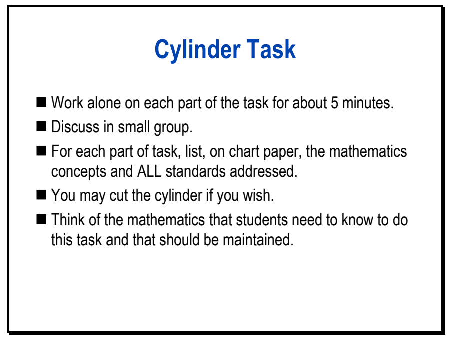




5. Ask participants to work in groups of three or four.

Slide: *Cylinder Task*

6. Show slide, *Cylinder Task,* and facilitate the activity:



Cylinders

- Distribute cylinders to each group.
- Tell participants to work alone on the task for about 5 minutes, and then have them discuss the problem in their small group. Emphasize that it is important for them to do the task (as opposed to just reading it and thinking about it).
- As they complete each part of the task, have them list, on their chart paper, the mathematics concepts and standards addressed.
- Be sure that participants review the standards and include all standards that are addressed, including the process standards. One of the main objectives of this session is to emphasize student engagement through the use of the process standards.
- Participants may wish to cut their cylinder apart to explore surface area and visualize its net. (If your cylinders are paper towel or toilet rolls, point out that they are missing their circular bases. Participants may wish to cut out paper bases for their cylinder shape.)
- As participants identify the mathematics and the mathematics standards involved in this task, ask them to think of the mathematics that students need to know to do this task and that should be maintained. We will use this discussion, "Concepts/Skills to Maintain," in a later activity.

7. As participants are working on the task, walk around the room observing the groups. Make a mental note of groups that have good insights or alternative solutions to parts of the task.

8. When participants have had ample time to finish the task, including listing on chart paper the mathematics standards addressed, call on the identified groups to share. As each part of the task is shared, make a master list of the mathematics addressed. Lists may include but are not limited to the "Grade 6 Mathematics Standards Included in Cylinder Task" on the next page.

Grade 6 Mathematics Standards Included in Cylinder Task

Part A: Summary of Concepts: surface area, mathematical communication, different representations, mathematical arguments

M6M4. Students will determine the surface area of solid figures (right rectangular prisms and cylinders.)
- a. Find the surface area of cylinders using manipulatives.

M6P3. Students will communicate mathematically.
- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

M6P5. Students will represent mathematics in multiple ways.

M6P2. Students will reason and evaluate mathematical arguments.

Part B: Summary of Concepts: surface area of cylinder, area of circle and rectangle, estimation, net, problem solving application, appropriate measurement units, decimals

M6N1. Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will use these concepts to solve problems.
- g. Solve problems involving fractions, decimals, and percents.

M6M4. Students will determine the surface area of solid figures (right rectangular prisms and cylinders.)
- c. Estimate the surface areas of simple geometric solids.
- a. Find the surface area of right rectangular prisms and cylinders using manipulatives and constructing nets.
- b. Compute the surface area of right rectangular prisms and cylinders using formulae.
- d. Solve application problems involving surface area of right rectangular prisms and cylinders.

M6M2. Students will use appropriate units of measure for finding length, perimeter, area, and volume and will express each quantity using the appropriate unit.
- b. Select and use units of appropriate size and type to measure length, perimeter, area and volume.

M6P1. Students will solve problems (using appropriate technology).
- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

Part C: Summary of Concepts: surface area, appropriate measurement units, different representations, mathematical modeling

M6M4. Students will determine the surface area of solid figures (right rectangular prisms and cylinders.)
- a. Find the surface area of cylinders using manipulatives and constructing nets.

M6M2. Students will use appropriate units of measure for finding length, perimeter, area, and volume and will express each quantity using the appropriate unit.
- b. Select and use units of appropriate size and type to measure length, perimeter, area and volume.
- c. Compare and contrast units of measure for perimeter, area, and volume.

M6P5. Students will represent mathematics in multiple ways.
- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

Part D: Summary of Concepts: surface area, algebraic expressions, symbols, mathematical arguments, mathematical language and communication, different representations

M6M4. Students will determine the surface area of solid figures (right rectangular prisms and cylinders).

M6A3. Students will write and evaluate algebraic expressions, including those with exponents.

M6P1. Students will solve problems (using appropriate technology).
- a. Build new mathematical knowledge through problem solving.

M6P2. Students will reason and evaluate mathematical arguments.
- b. Make and investigate mathematical conjectures.

M6P3. Students will communicate mathematically.

M6P5. Students will represent mathematics in multiple ways.

Part E: Summary of Concepts: surface area of cylinder and right rectangular prism, estimation, problem solving application, appropriate measurement units, decimals, mathematical connections, arguments and communication

M6N1. Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will use these concepts to solve problems.
- g. Solve problems involving fractions, decimals, and percents.

M6M4. Students will determine the surface area of solid figures (right rectangular prisms and cylinders).
- d. Solve application problems involving surface area of right rectangular prisms and cylinders.

M6P1. Students will solve problems (using appropriate technology).
- a. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.

M6P2. Students will reason and evaluate mathematical arguments.

c. Develop and evaluate mathematical arguments and proofs.

M6P3. Students will communicate mathematically.

b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

M6P4. Students will make connections among mathematical ideas and to other disciplines.

a. Recognize and use connections among mathematical ideas.

c. Recognize and apply mathematics in contexts outside of mathematics

M6P5. Students will represent mathematics in multiple ways.

a. Create and use representations to organize, record, and communicate mathematical ideas.

c. Use representations to model and interpret physical, social, and mathematical phenomena.

__Concepts/Skills to Maintain__

Part A

pi, area of a circle, radius, diameter, circumference of a circle, area of a rectangle
(Note: These concepts and skills may be new to this year's sixth grade students who have not yet had the GPS.)

Part B

calculating with whole numbers and decimals

Part C

centimeters

Part D

simple exponents, conventions for multiplying letters and numbers

NOTE about Cylinder Task: Answers will vary to Part C, but will be composed of a rectangular region (the lateral area) and two circular bases. However, the bases must be attached carefully while visualizing the spatial relationship between the bases and the rectangular region. Both bases cannot be attached to the same side - a side formed by the circumference of the circle - of the rectangular region, or the pattern will not fold up into a cylinder. (The bases may be attached to the two vertices that are the endpoints of this same side- then the pattern will fold to form a cylinder.)

In other words, if your pattern looks like a wagon, you cannot fold it to form a cylinder.
The formula for Part D is $S = 2\pi r^2 + 2\pi rh$.

9. Transition: **Now that we've looked at the standards and concepts related to this task, let's try to develop it further.**

GRASPS Review (15 minutes)

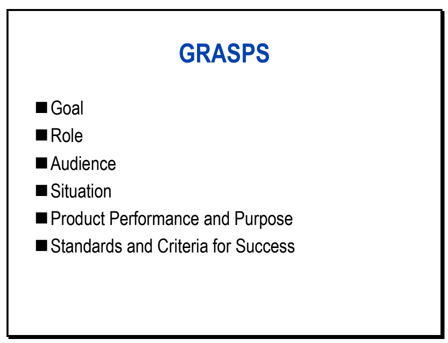
1. Present: **Look back at Day 3 training and the acronym GRASPS**.

2. Ask: **What does GRASPS stand for?**

Slide: *GRASPS*

3. Show slide, *GRASPS.* Present: **Let's discuss how this task can be turned into a GRASPS activity.** (If participants need to review GRASPS, refer them to the UbD Workbook, p. 170.)

4. Allow about 15 minutes for discussion on how to incorporate each of the follow elements.



- Goal
- Role
- Audience
- Situation
- Product Performance and Purpose
- Standards and Criteria for Success

Instructional Strategies Activity (30 min.)

PG-8

1. After participants have discussed the mathematics involved in the cylinder task, instruct them to look at the strategies sheet, p. 8 in the Participant Guide.

2. Ask: **What strategies did we use doing this task?**

   - Examples: simulation, cooperative learning groups

3. Ask: **If the cylinder task were used in the classroom as an instructional task, what strategies would apply?**

   - Example: cooperative learning groups, discussion, problem solving, concept formation

4. Ask participants to discuss, in groups: **Are there strategies that you would use in your classrooms that we did not use?**

5. Have them discuss in groups, record their answers to each question, and then share with the whole group.

6. Record the strategies on chart paper under the title "Mathematics Instructional Strategies."

Constructing a Learning Plan Activity (2 hr.)

PG-17

1. Refer participants to the sample unit plan on surface area, beginning on page 17 in the Participant Guide.

Mathematics Grade 6 Sample Unit Plan: Surface Area (PG-17)

Stage 1- Desired Results	
Established Goals: M6M4: Students will determine the surface area of solid figures (right prisms and cylinders). a. Find the surface area of a right prism and cylinder using manipulatives and constructing nets. b. Compute the surface area of a right prism and cylinder using formulae. c. Estimate the surface area of a simple geometric solid. d. Solve application problems involving surface area of right prisms and cylinders. M6P1. Students will solve problems (using appropriate technology). M6P2. Students will reason and evaluate mathematical arguments. M6P3. Students will communicate mathematically. M6P4. Students will make connections among mathematical ideas and to other disciplines. M6P5. Students will represent mathematics in multiple ways.	
Understandings: Students will understand that… • Formulas for calculating surface area are derived from the areas of plane figures. • Using nets and creating mathematical models help us to derive and illustrate surface area formulas. • Solids have both surface area and volume. • The surface area of a solid is the total area (the sum) of the areas of all its faces. • The volume of a solid is the measure of the amount of space the solid occupies.	**Unit Essential Questions** • How are the formulas for calculating the surface area of right prisms and cylinders derived from the areas of plane figures and how can nets be used to illustrate this? • How would you compare and contrast surface area and volume?
Knowledge: Students will know… • The definitions of right rectangular prism, right cylinder, volume, surface area, and net • Formulas for surface area of a cylinder and a right rectangular prism (if you want students to memorize these)	**Skills**: Students will be able to … • Find the surface area of a right prism and cylinder using manipulatives and constructing nets. • Derive formulas for the surface areas of right rectangular prisms and cylinders using areas of rectangles and circles. • Compute the surface area of right rectangular prisms and cylinders using formulae. • Estimate the surface area of a simple geometric solid. • Solve application problems involving surface area of right rectangular prisms

	and cylinders.

Stage 2-Assessment Evidence

Performance Tasks

1. GRASPS
   Goal: Determine the most efficient package to use for shipping a single softball.

   Role: You are an industrial engineer for ABC Softball Company.

   Audience: The target audience is the shipping manager of ABC Softball Company.

   Situation: Your company ships out souvenir softballs one at a time. The shipping manager has told you to determine whether a tube or a box would be the most efficient way to send the individual softballs.

   Product Performance and Purpose: Manufacturers design efficient packages that are the right size for their products. The less wasted volume in a package, the more money a company saves. Packaging material is expensive, and it usually ends up in a landfill or a recycling plant. Therefore, reducing the amount of material required is good economics and good for the environment.
   You will need to construct two types of packaging for a softball. One package has the shape of a prism. The other has the shape of cylinder or a tube. You will construct the minimum size of each package for a softball. You will also determine which of the two types of packages uses less material.
   Calculate and record the surface areas of the box and tube. Put the ball in the box and then in the tube. Does the ball fit in both containers with little wasted space? Which container uses less material, the box or the tube? Why? If you use the container with the smallest surface area to package 100,000 softballs, how many square centimeters of packaging material will you save over the other container? If you ship X softballs, how much would you save?

   Standards and Criteria for Success: Your presentation materials should include the tube and box that you constructed as well as the net that you used to construct them. Also, you should include a written report that addresses the following:
   - type of container that you recommend;
   - surface area of each of your containers including your calculations;
   - information regarding how much your company would save by using your container if 100,000 individual softballs were sent;
   - copy of Excel or other spreadsheet showing how much money your company would save by using your container for any given number of softballs shipped.

2. Given a right rectangular prism (box), use centimeter grid paper to make at least three nets to form the box. Test each paper net by cutting it out and wrapping it around the box. Then write descriptions for your nets.

3. Carly is a packaging designer for a cereal manufacturer. When she designs a new cereal box, she must report the amount of material that will be required to make the box. What amount should Carly report for the design shown? Show how you determined your amount and explain your process. Use illustrations to support your justifications.

4. Use tasks listed in the Grade 6 Mathematics GPS.

Other Evidence
Academic Prompts:
- How can we use nets to derive the formula for surface area of any solid figure?
- What is the relationship between a solid figure and its surface area?
- How might the surface area be found given the volume of a solid figure?
- Explain how changing the dimensions of a solid figure affect the surface area.
- Suppose the radius and height of a cylinder are given in centimeters. What is the most convenient unit for the surface area of the cylinder?
- Make a conjecture about the ratio of the surface areas of two similar solids. Make a conjecture about the ratio of the volumes of two similar solids.
- Compare and contrast surface area and volume.

Quiz and Test Items:
1. Given that the volume of a cube is 64 cubic centimeters, find the surface area and construct the net and solid.
2. Provided some solid figures, find the surface area.
3. Develop four problems on surface area where one answer choice is correct, one answer choice is a common mistake/misunderstanding, and one answer choice is just wrong. Be sure to illustrate and support each answer choice.
4. Given a figure (pairs of students will have different solid figures), explain in writing how you would help a friend determine how much wrapping paper is needed to cover the entire figure without overlapping. Now, exchange papers with your pair partner and provide your classmate with feedback on the process. Refer to the standard and elements as you provide detailed feedback and utilize illustrations and detailed work to support your commentary.
5. Let l be the length, w the width, and h the height of a rectangular prism. Show that the surface area of the prism can be found with this formula.
   Surface Area = $2lw + 2lh + 2wh$.

Informal Checks for Understanding:
- Frequently throughout the unit, use the 3-2-1 summarizing strategy. For example, ask the students to answer the following three questions and turn them in as they leave the room.
  1. List 3 things that you have learned about determining the surface area of prisms and cylinders.
  2. If you were the teacher of this class next year, what two things would you do to ensure that the students truly understand surface area?
  3. Estimate the surface area of (some object in your classroom).
- Everyday as students work on their math assignments, monitor student progress by walking around the room and examining each individual's (or group's) work to identify misunderstandings.
- Monitor as students summarize while participating in inside-outside circle cooperative learning structure.
- Use student-generated Maps on the Wall created before the test and left up during the test.

Stage 3-Learning Plan

Consider the WHERETO elements.

W *= Students:* ***W****here the unit is going,* ***W****hat is expected (goals, expectations, relevance/value);*
Teacher: ***W****here the students are coming from (diagnosis)*
H *=* ***H****ook students,* ***H****old their interest*
E *=* ***E****quip students,* ***E****xperience key ideas,* ***E****xplore the issues*
R *=* ***R****ethink,* ***R****eflect,* ***R****evise,* ***R****ehearse,* ***R****evisit,* ***R****efine*
E *= Students* ***E****valuate their own work*
T *=* ***T****ailored (to needs, interests, abilities of learners) and flexible*
(differentiation – content, process, product)
O *=* ***O****rganized and sequenced (to maximize engagement, effective learning)*

2. Ask participants to think about the hook activity they did – the cylinder task. Also ask them to review the Concepts/Skills to Maintain that they identified for this task.

3. Present: **Let's think of this task (part e) as the culminating activity – the performance assessment task – for this unit.**

4. Ask: **What kinds of activities and what instructional strategies would you use to get your students ready for this assessment? Or you may use this task as an instructional task that you include in your Stage 3 learning plan for this unit. What kinds of other instructional strategies and activities would you include in your plan? What assessments would you use?**

5. Facilitate activity:

PG-8

- **In your groups, decide how you will use this task. Will it be used for assessment or instruction? Look at the list of instructional strategies and write down the strategies you would use and then the activities your student would participate in.**
- **Record your learning plan.**
- **Review your goals, enduring understandings, unit essential questions, knowledge and skills, and formal and informal assessments. Make any changes your group wishes in your unit.**
- **As you design your effective learning plan, be sure to create a balance of activities with respect to multiple intelligences, different learning styles, different levels of knowledge and skills.**

6. As the groups work, walk around the room, observing their discussions. As needed, ask questions such as these:

   - **How do you know what your students already know about area and cylinders?**
   - **What misconceptions have your students developed about these concepts?**
   - **Have you hooked your students – are they interested?**
   - **Will your students be engaged in learning?**
   - **Are your activities front-loading too much information?**
   - **Are you providing feedback to students?**

7. Facilitate a peer review and revision of the units:

   - Ask one person from each group go to the next group, explain their plan, and then listen to and record the comments of his/her critical friends.
   - Then the person returns to his/her group, and explains the comments made.
   - The group then discusses possible improvements in their unit.
   - After improvements are made, have the groups post their units – particularly Stage 3, the learning plan.
   - Have everyone participate in a gallery walk around the room, to read the other plans. Point out to the class some of the best learning activities and instructional strategies.

Designing Units Using Concept Mapping Activity (45 min.)

Trainer's Note: *This activity is designed to help teachers see one way to group standards together to form units. Another way is to cut the standards themselves apart, and group and regroup them as relationships are noted. This activity enables teachers to see more easily the relationships between mathematical concepts and the connections that can be made. Stress that there is no "right' way to group standards – mathematical big ideas (concepts and skills) may be grouped in different ways, depending on students' knowledge and interests, teacher resources and preferences, etc.*

Trainer's Note: *To prepare for this activity, you must copy and cut out the three sheets of concept cards found on the last pages of this guide.*

8. Ask participants to work in small groups.

Concept Cards

9. Hold up the cards. Say: **I have a set of cards here. These cards represent the big ideas – the important concepts and skills – of the Grade 6 Mathematics GPS.**
10. Distribute one set of cards to each of the groups.
11. Ask each group to arrange the cards so that related concepts are grouped together.

    Trainer's Note: *Some people may be familiar with doing this activity using a spider web map – ovals with the concepts on them and lines between related concepts. Using cards allows people to group and regroup easily.*

12. Allow a few minutes.
13. Say: **Now that you see relationships between these concepts and skills – these big ideas – how do you want to group these concepts into units?**

14. Ask them to record their answer – their grouping of these concepts – on chart paper and share with the whole group. (If any participants are having difficulty with the big ideas, you may want to suggest that they list their big ideas from the standards, then group them.) One set of answers follows:

 - M6N1: positive rational number, factor (greatest common factor), multiple (least common multiple), prime factorization (Fundamental Theorem of Arithmetic), fractions and mixed numbers, decimal, percent, different representations of positive rational numbers, computation with positive rational numbers
 - M6G1, 2: plane figures, solid figures, right rectangular prisms, cylinders, pyramids, cones, symmetry (line and rotational), similarity, scale drawing, net
 - M6M1, 2, 3, 4: measure conversion, measurement units, volume, surface area, estimating measures
 - M6A1, 2, 3: ratio, proportion, direct proportion, proportional reasoning, pattern, algebraic reasoning, exponent, equation
 - M6D1, 2: sampling, frequency distributions and tables; graphs (picture, bar, line, circle, histogram, line plot), variation, probability (experimental and theoretical), predictions from data
 - M6P1, 2, 3, 4, 5: problem solving (problem solving strategies), mathematical arguments, mathematical language and communication, connections (within mathematics and between it and other contexts), different representations

Designing Another Unit Activity (1 hour, 15 min.)

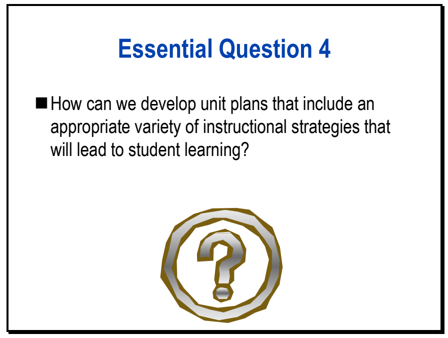
PG- 22-24

1. Present:

 - **In your small groups, look at your chart – your concept map – showing how you grouped these sixth grade concepts.**
 - **Design one unit, using the template that begins on page 22 in your Participant's Guide, that incorporates some of the related concepts.**
 - **Do as much as you can in an hour.**

2. At the end of an hour, allow about fifteen minutes for groups to present their units.

3. Show slide, *Essential Question 4* and ask participants for final comments on this question.



4. Transition: **Now that we have completed Stages 1, 2, and 3 of the Unit Plan, it is vital to examine protocols for improving the quality of student work.**

Examining Student Work

Time 2 hours

Overview Participants learn about different protocols for examining student work.

Objective

- Describe how to use a structured, collaborative process for examining student work.
- Demonstrate how to use teacher commentary to increase student learning.

Activities

- Collaborating to Improve the Quality of Student Work
- Developing Useful Teacher Commentary

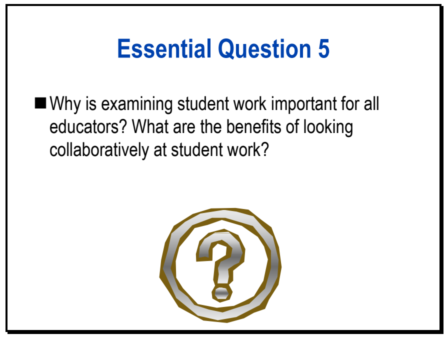
Materials

- Chart paper
- Transparencies or PowerPoint presentation
- Flipchart markers
- Sample teacher assignment and student work

Collaborating to Improve the Quality of Student Work

Slide, *Essential Question 5*

1. Show slide, *Essential Question 5.* Present: This is the essential question that we will attempt to answer next.



PG-25

2. Refer participants to *How We Know What Students Know and Are Able to Do*, on page 25 in their Participant's Guides. (See next page.)

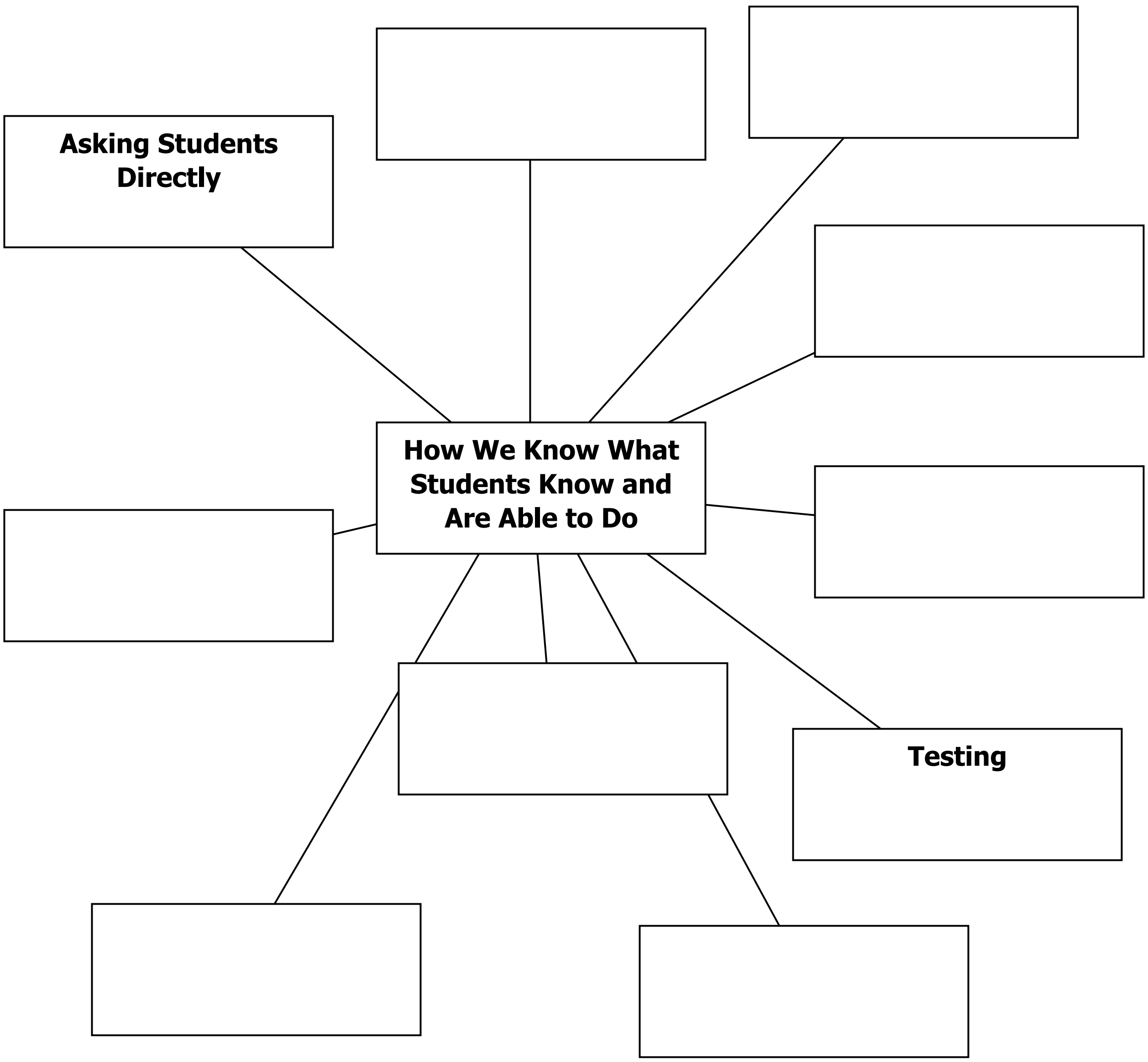
3. Ask participants to identify methods classroom teachers use to assess student knowledge and skills. Explain that the identified method should be placed on the map on the page to show a relationship between the methods listed. For example, asking students direct questions is not closely related to testing them, so these items should be separated by considerable space. However, various types of testing are closely related and should be put in closer proximity to each other. Explain that participants can draw additional lines and boxes on the organizer to include sub-topics.

Flipchart

4. Have groups share their work. Record the comments on a flipchart or overhead transparency.

How We Know What Students Know and Are Able to Do (PG-25)

Identify ways we know what students know and are able to do. Use the map below to show relationships among the different methods.

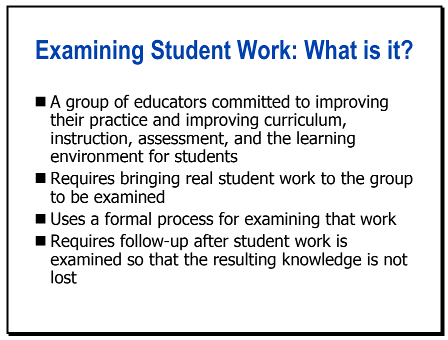


From the Association for Supervision and Curriculum Development (ASCD).

5. Present: **For schools and leaders to be truly effective they must clearly understand what their students know and are able to do. We are going to discuss a method that may not be on your organizer: collaboratively examining student work**.

Slide: *Examining Student Work: What is it?*

6. Show slide, *Examining Student Work: What is it?* Present contents of slide.



7. Present:

   - **In 1993 a group of 23 heart surgeons agreed to observe each other regularly in the operating room and to share their know-how, insights, and approaches. In the two years after their nine-month-long project, the death rate among their patients fell by an astonishing 25 percent. The study shows that merely by emphasizing teamwork and communication instead of functioning like solitary craftsmen, all the doctors brought about major changes in their individual and institutional practices.**

   - **Teachers, like heart surgeons, have traditionally worked in isolation. A powerful lesson can be learned from this study. Many educators now emphatically believe that if our goal is to lower the "death rate" of young minds and see them thrive, we can do it better together than by working alone. (www.essentialschools.org)**

Slide: *Examining Student Work: Why do it*

8. Show slide, *Examining Student Work: Why do it?*

Examining Student Work: Why do it?

- To improve teaching and student learning
- To ensure learning activities and strategies align with standards
- To allow teachers to calibrate their understanding of what quality looks like
- To encourage appropriate rigor in learning activities
- To inform instructional decision-making
- To help identify trends

9. Present:

   - **Working collaboratively to examine student work, educators can learn not only what their students know and are able to do but also how to help them move forward through improved classroom instruction.**
   - **Educators also desire and need quality professional development experiences that reduce the isolation they often feel. While outside experts often share wisdom and inspiration, their messages, by themselves, seldom result in substantive change. Good job-embedded professional development can be more effective in bringing about change in the classroom when it arises from the classroom, when educators contribute their personal teaching experiences to discussions with their colleagues, and when educators begin to make changes with their colleagues' support.**

10. Present: **To improve teaching and student learning**:

   - **Teachers share responsibility among themselves for improved practice and for improved student achievement.**

11. Present: **To inform instructional decision-making:**

    - **Instead of disappearing into a book bag or trash can, student work becomes a valuable piece of evidence of the effectiveness of a school's practice.**
    - **Unlike standardized test results, the evidence provided by examining student work speaks of what teachers do and students learn.**

12. Present: **To ensure learning activities and strategies align with standards**:

    - **We need to make sure that our assignments and expectations are aligned with the GPS, and we can do this by looking collaboratively at student work.**
    - **We need to be continually questioning ourselves about the expectations at each grade level. In many cases, we may have misconceptions about <u>what proficient work looks like.</u> We may think that our expectations match those of others only to be surprised when our students do not do well on a statewide criterion-reference test, an AP exam, or an EOCT. Clearly, if our students are meeting our expectations, but not doing well on standardized exams, then our expectations are too low. Research has shown that when expectations are raised (and appropriate supports are put in place), student achievement rises.**

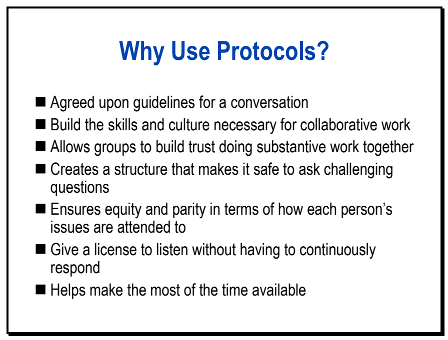
13. Present**: When considering appropriate rigor in learning activities:**

    - **Do you ever wonder whether the demands that you place on your students are rigorous enough?**
    - **Do you ever worry that you are assigning work that is below the grade level expectations that are stated in the GPS?**
    - **Do you ever wonder whether others who teach the same subject at the same grade have the same level of rigor?**
    - **How often do you work collaboratively with other teachers to make sure that the assignments, and the ways you score them, really meet the standards?**

Slide: *Why Use Protocols?*

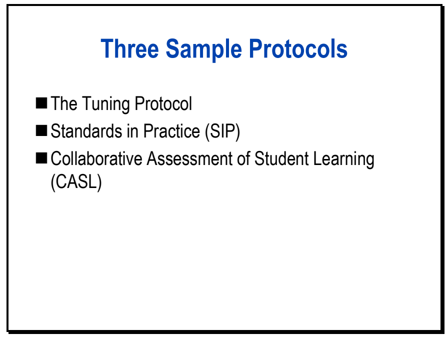
14. Show slide, *Why Use Protocols?* Present:

- **Many organizations have developed strategies for examining student work. Many different protocols have been developed. Many have specific assessment purposes but all have, at the heart of the strategy, the goal of creating a safe place for teachers to share the work of their students, a place that encourages honest exchange among the teacher participants.**
- **Protocols have been developed for different purposes. Each emphasizes a different aspect of evaluation.**



Slide: *Three Sample Protocols*

15. Show slide, *Three Sample Protocols.* Present: **We are going to look at three protocols today**:



- **The Tuning Protocol emphasizes evaluative feedback from participants. It is a collaborative process that helps participants "fine tune" their instruction (which will lead to more "tuned" student work) using a definite protocol or process. Participants and presenters take turns both talking and listening to each other trying to answer the questions the presenter of the student work is asking.**
- **Standards in Practice (SIP) is a process that works to ensure that student work is aligned with the standards. Developed by the Education Trust, a non-profit organization that advocates for the high achievement of all students in kindergarten through college, it helps schools improve student achievement by monitoring the effectiveness of instruction. SIP looks at teacher work through the duel lens of classroom assignments and students performance on assignments. The purpose of SIP is to increase the rigor of teachers' assignments by aligning them with standards so that student achievement rises to meet the standards.**
- **The Collaborative Assessment of Student Learning (CASL) works to help teachers identify and evaluate learning strategies for students. CASL focuses on accomplishing a particular learning target linked to a specific standard. A teacher does this by identifying and focusing on the progress of a student over time. This helps deepen a teachers' understanding of how children come to make meaning of and master a particular concept or skill.**

PG-26-29
PG-30-39
PG-40-42

16. Present: **It is very important that you select the protocol that best fits the culture of your school. We have included information on these three protocols in your Participant's Guides**. **You may get more information at the website Looking at Student Work (www.lasw.org) maintained by the Annenberg Institute for School Reform. This web site includes a synopsis of a dozen different strategies for examining student work as well as links to learn more about each of them.**

17. Present:

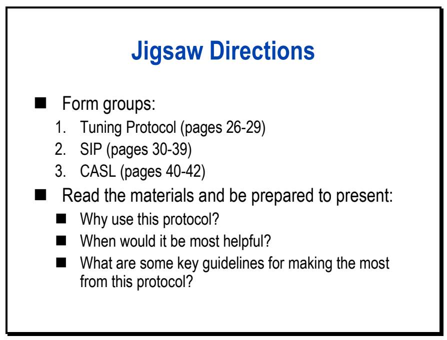
    - **All these processes work with many types of groups – job-alike, grade level, administrators, combined grade-levels, mixed groups, etc.**
    - **It is important, no matter how the groups are determined, that the same groups work together regularly. The more regularly the same people meet, the more beneficial the process.**
    - **The number of people in a group may vary. Most groups average six to eight members.**
    - **The ideal amount of time varies from one to three hours, depending on the process. All protocols can be modified to use time available!**
    - **Having a time keeper is very important. This can help ensure that the process is accomplished in the allotted time.**
    - **These processes can take place anywhere. The optimal setting is a table where all participants can see one another as they work.**
    - **When possible, any group meeting for the first time should have a facilitator who is familiar with the process.**
    - **As with all professional learning activities, follow-up is a key component. Examining student work is important, but taking action as a result of the process is even more important.**

Sample Student Work

18. Transition: **Let's use a jigsaw activity to explore these three protocols**.

19. Show slide *Jigsaw Directions* and facilitate activity:

    - Ask participants to count off by threes.
    - Assign protocols as shown on slide.
    - Refer participants to correct pages in Participant's Guide.
    - Ask them to concentrate on the three questions on the slide.
    - Distribute sample work for jigsaw. Explain that they can look at this work and discuss how using the protocol might be helpful.



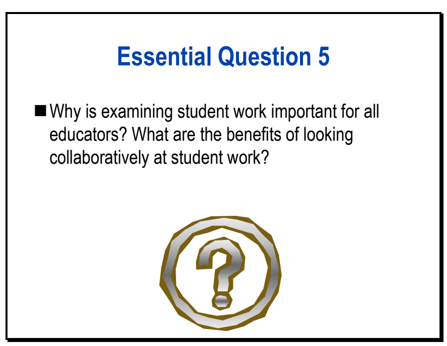
20. Allow 25 minutes for small group work.

21. Ask each group to report out.

22. Discuss: **How can you get started using one or more of these protocols in yours schools?**

Slide, *Essential Question 5*

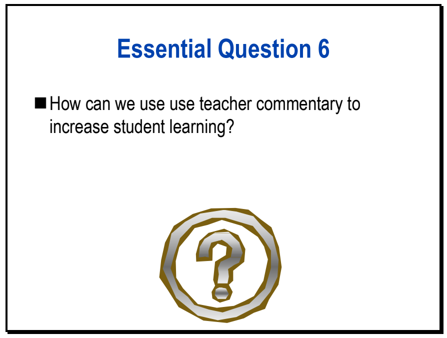
23. Show slide, *Essential Question 5,* and ask participants to share their observations.



Developing Useful Teacher Commentary

Slide, *Essential Question 6*

1. Show slide, *Essential Question 6.* Present: **Related to the process of examining student work is the task of writing teacher commentary. Let's look at that.**



2. Ask: **What is teacher commentary?** Allow for responses, but be sure to include:

   - **Feedback to students that lets them know how the students ' "evidence" matches up against the expectations expressed in the standards. It may be oral or in writing, and both are suggested.**
   - **Teacher commentary is formative in nature; it tells the student how to improve (and assumes that s/he will have opportunities to do so!)**

3. Ask: **What is the purpose of teacher commentary?** Allow for responses, but be sure to include:

   - **To correct knowledge gaps or skill deficits**
   - **To provide feedback that is specific and helpful to the student**
   - **To encourage the student to continue trying**
   - **To guide learning by letting the student know where s/he needs to focus.**
   - **To keep a written record of student progress.**

4. Ask: **How often should one provide teacher commentary on student work?** Allow for responses, but be sure to include:

   - **There are no hard-and-fast rules about how often you should include teacher commentary in your feedback to students. Common sense says that it is impractical to expect that every piece of work would have detailed commentary; on the other hand, if teacher commentary is only provided at the end of a unit/course,, it doesn't offer much opportunity for the student to learn and improve! Here are some general guidelines.**

   - **Often enough to document progress throughout a unit/course**
   - **Often enough so that students can make adjustments and learn and then demonstrate new learning.**
   - **Often enough so that students can see patterns in their work and in the commentary their work elicits.**

5. Ask: **What are some guidelines for providing good teacher commentary?** Allow for responses, but be sure to include:

   - First, review the standards and elements so that you have expectations clearly in your mind, and so that you can refer to them (in terms students understand) in your commentary.
   - Center your comments around the standards and elements. If the teacher commentary is in writing, think of it as a "written conference."
   - Be very specific; this helps students know exactly what they're doing right and/or wrong.

PG-43

6. Refer participants to a summary of the above information on page 43 in their Participant's Guides.

Teacher Commentary (PG-43)

What	Feedback to students that lets them know how the student's "evidence" matches up against the expectations expressed in the standards. It may be oral or in writing, and both are suggested. Teacher commentary is formative in nature; it tells the student how to improve (and assumes that s/he will have opportunities to do so!)
Why	➢ To correct knowledge gaps or skill deficits ➢ To provide feedback that is specific and helpful to the student ➢ To encourage the student to continue trying ➢ To guide learning by letting the student know where s/she needs to focus. ➢ To keep a written record of student progress.
When	There are no hard-and-fast rules about how often you should include teacher commentary in your feedback to students. Common sense says that it is impractical to expect that every piece of work would have detailed commentary; on the other hand, if teacher commentary is only provided at the end of a unit/course, it doesn't offer much opportunity for the student to learn and improve! Here are some general guidelines. ➢ Often enough to document progress throughout a unit ➢ Often enough so that students can make adjustments and learn and then demonstrate new learning. ➢ Often enough so that students can see patterns in their work and in the commentary their work elicits.
How	First, review the standards and elements so that you have expectations clearly in your mind, and so that you can refer to them (in terms students understand) in your commentary. Center your comments around the standards and elements. If the teacher commentary is in writing, think of it as a "written conference." Be very specific; this helps students know exactly what they are doing right and/or wrong.

Sample student work

7. Refer participants to the student work that they saw in the previous exercise and ask them to independently develop teacher commentary for one piece of work.

8. Allow ten minutes.

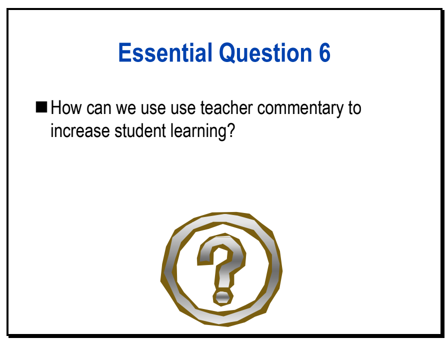
9. Ask participants to share their commentary with a partner. Ask partners to provide "commentary on the commentary."

10. Allow five minutes.

11. Ask volunteers to offer one thing each that they could do immediately to improve their practice in the area of teacher commentary.

Slide, *Essential Question 6*

12. Show slide, *Essential Question 6,* and ask participants to share their observations.



13. Transition**: Now that we've taken a look at student work and teacher commentary, we're going to move on to a brief discussion of curriculum mapping.**

Curriculum Mapping

Time 1 hour

Overview In this brief section, participants begin to think about the formats and processes that they would like to use to map out their instructional units throughout the school year.

Objective
- Explain different ways to map curricula.

Activities
- Basic Principles of Curriculum Mapping
- Creating a Sample Map

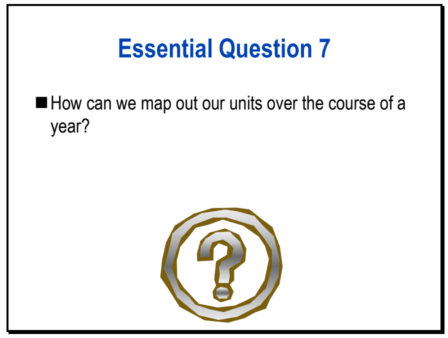
Materials
- Chart paper
- Transparencies or PowerPoint presentation
- Sample maps

Trainer's Note: *The Heidi Hayes Jacobs book,* Mapping the Big Picture, *contains 17 sample curriculum maps in the appendix. You should choose a sample from those, or from others that you have, to show the participants. Because different types of maps might appeal differently to teachers in various subjects and at various grade levels, we are not prescribing a specific set of samples for you to use, but the Hayes Jacobs book is a great starting point. Also, you should provide a variety of maps to show the many ways that they can be used. For Mathematics Grade 6, it is suggested that you use maps B, C, and H from the book.*

25 min. **Basic Principles for Curriculum Mapping**

Slide, *Essential Question 7*

1. Show slide, *Essential Question 7.*



2. Ask: **How is mapping like planning a group tour for 100 people in Europe? Jot down your thoughts, then share with your table partners.**

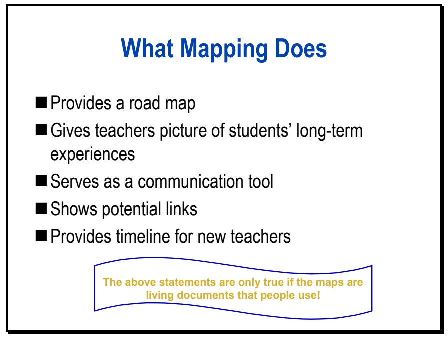
3. Lead a discussion of the similarities. Make the following points if they do not come from the participants:

- You need a master itinerary that shows where everyone will be at all times.
- You want everyone to see the really important sites.
- Without a plan, many group members could wander off on side trips or stay too long in "favorite places."
- You need a way to communicate all the events to the tour group members.
- You need some flexibility to allow for special needs and interests.
- If you are to have a common assessment at the end of the trip [CRCT, EOCT, GHSGT], you need a common map.

4. Present: **Teachers often work in isolation, or in what we have come to refer to as "private practice," to plan the scope and sequence of their instructional units. Mapping, by contrast, is a collegial or collaborative approach.**

Slide, *What Mapping Does*

5. Show slide, *What Mapping Does*, and go over the following points, revealing each bullet on the slide to correspond with the discussion points below:



- **Maps work just like itineraries or road maps to show teachers where they are in a particular scope and sequence, what their students have been learning, and where their students need to be by the end of the unit, year, or grade level. They simply show where students have been and where they are going. Teachers need each other's maps to see the bigger, K-12 curriculum perspective.**
- **Individual teachers use maps to get a picture of what students experience from grade to grade. Though teachers work in the same building, they may have sketchy knowledge about what goes on in other classrooms. If gaps exist among teachers within buildings, there are chasms among buildings in a district. When this is true, transient students experience a happenstance curriculum.**
- **There may be gaps between a standard and what is actually taught. These curriculum gaps negatively impact student learning. Maps may indicate missing pieces in vertical and horizontal articulation.**
- **Maps may also reveal repetitions. Too often teachers assume that they are introducing a concept, or even a book, for the first time, and students are subjected to repetitious instruction.**
- **Maps serve as communication tools, not only for teachers, but for parents and students as well. They are especially useful for communicating curricular expectations to parents and students and for determining progress toward those expectations.**
- **Maps show potential links between subject matter and possibilities for natural connections for content integration or interdisciplinary units.**

- **Maps provide a calendar-based timeline for teachers. This is most helpful for new teachers not experienced in pacing the curriculum.**

6. Present: **The map should be viewed as a "living" document that plays an integral part in teacher planning each day. For that reason, many of our schools need to redo old maps, especially if they do not reflect the new GPS.**

Sample Maps

7. Distribute sample maps or refer participants to sample maps in *Mapping the Big Picture*.

Trainer's Note: You should have chosen several from the Heidi Hayes Jacob book(or from your own files). See note on previous page.

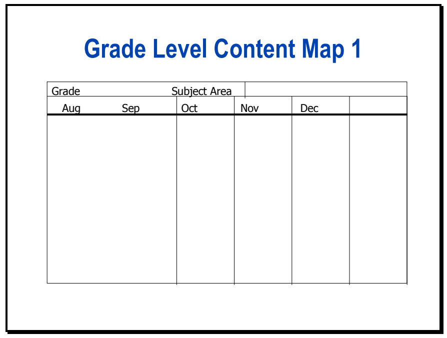
8. Discuss the maps, pointing out that they are not free from error but represent efforts by these schools/systems.

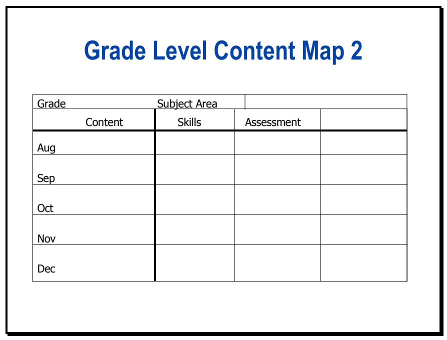
9.Present: **The samples you have may differ from each other, and the variations on the curriculum map are limited only by your imagination. As we've discussed, you can:**

- **Use them to map out textbooks, technology, and other resources to units.**
- **Use them to show relationships from subject to subject (horizontal) or from year to year in the same subject (vertical).**
- **Create them on large butcher paper, index cards, standard 8½ X 11 sheets of paper, or on a computer.**
- **Organize them by the months of the school year down the side or across the top.**
- **Create both "macro" level maps that show the high level curriculum throughout the K-12 experience and "micro" level maps that explain in detail what happens in one subject in one grade level in one year, and various combinations of the two.**

Slides (2), *Grade Level Content Maps*

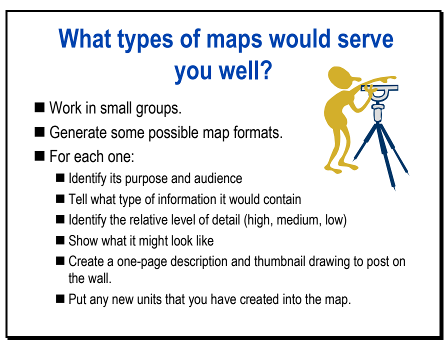
10.Show slide with sample maps, *Grade Level Content Maps*. Explain that these are just two types of examples.





Slide, *What types of maps would serve you well?*

11.Show slide, *What types of maps would serve you well?* Read the directions.



Flipchart paper
Markers

12. Divide the class into groups of 3 – 5. Provide each group with flipchart paper (or other large-format paper) and markers to display each idea they have. Encourage creativity.

13. Allow 25 minutes for small group work.

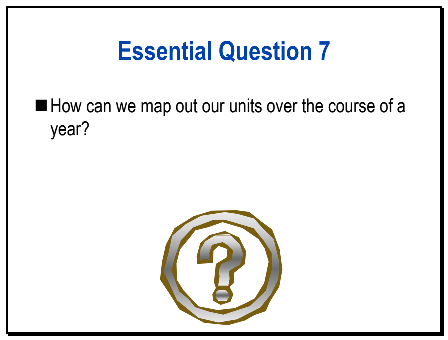
14. Ask each group to post their work. Invite all participants to walk around the room and see what each team has developed.

    Trainer's Note: *Ask participants to remain standing for the next activity.*

15. Debrief: Were there any "Aha's--revelations" during this activity? What were they?

Slide, *Essential Question 7*

16. Show slide, *Essential Question 7,* and ask participants to share their observations.

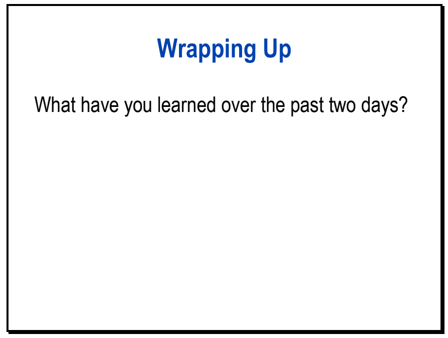


17. Summarize the workshop: Ask participants to volunteer one immediate and one long-term "to do" related to instruction.

18. Show slide, Wrapping Up, Present:
    - **At the beginning of this workshop, I asked you to think of one specific thing you hoped to get out of this training. I's like for you to return to that at this time.**
    - **Did you learn what you hoped to learn?**
    - **Is there anything you still need to know before you leave today?**

19. Present**: This has been a challenging year for all of us, but I'm confident that you're ready to begin implementing the GPS. Please remember that the system curriculum personnel and the curriculum specialists at the DOE are available to answer questions or provide assistance**.

Slide: *Wrapping Up*



positive rational number	factor	greatest common factor	least common multiple
prime factorization	Fundamental Theorem of Arithmetic	fraction and mixed number	decimal number
percent	different representations of positive rational numbers	computation with rational numbers	plane figure
solid figure	right rectangular prism	cylinder	pyramid

sampling	line symmetry	cone	rotational symmetry
similarity	scale drawing	net	measure conversion
estimating measures	surface area	volume	measurement unit
ratio	proportion	direct proportion	proportional reasoning

frequency distributions	frequency table	picture graph	bar graph
line graph	circle graph	histogram	line plot
variation	experimental probability	theoretical probability	prediction
problem solving strategy	mathematical argument	mathematical language and communication	mathematical connections within mathematics and other contexts

pattern	graph	probability	
exponent	algebraic expression	equation	