

# The Art and Science of Teaching

## Unit Planning

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### Getting Serious About School Reform

Three Critical Commitments Schools/Districts Should Make

- 1 Providing specific **feedback** on learning goals at the classroom, school and district levels.
- 2 Ensuring **effective teaching** in every classroom.
- 3 Building **background knowledge** for all students.

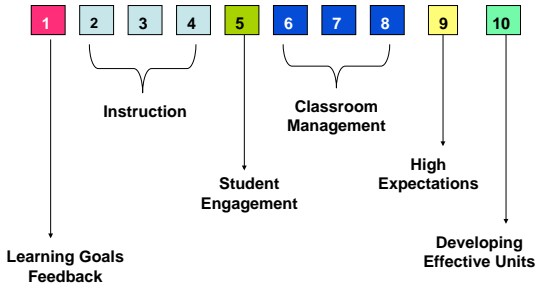
## Learning Goals

This presentation will focus on the first four instructional design questions from the comprehensive framework for effective instruction presented in the *Art and Science of Teaching*. The session will address :

- The action steps related to each of the first four questions.
- The interaction of the four questions in the planning process.
- How to analyze a unit of instruction that has been developed using the four questions.

### The Art and Science of Teaching

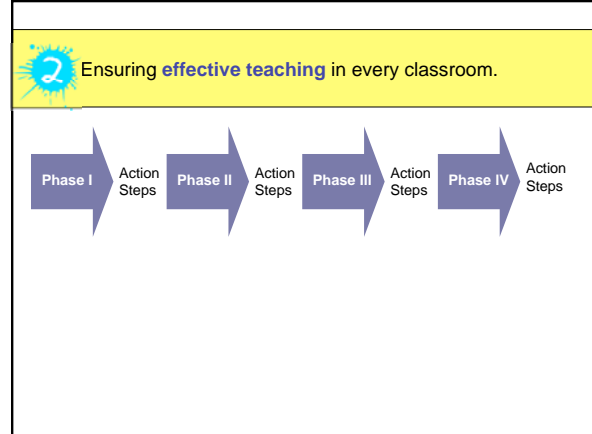
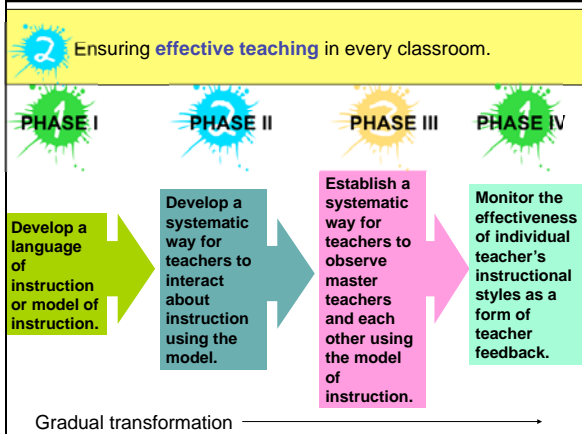
The Art & Science of Teaching involves 10 “design questions” teachers can ask themselves as they plan a unit of instruction.




The diagram shows 10 numbered boxes (1-10) at the top. Below them are four categories: 'Instruction' (questions 2, 3, 4), 'Classroom Management' (questions 6, 7, 8), 'Student Engagement' (question 5), and 'High Expectations' (question 9). Arrows point from question 1 to 'Learning Goals Feedback' and from question 10 to 'Developing Effective Units'.

- 1 What Will I Do to Establish and Communicate Learning Goals, Track Student Progress, and Celebrate Success?
- 2 What Will I Do To Help Students Effectively Interact with New Knowledge?
- 3 What Will I Do to Help Students Practice and Deepen Their Understanding of New Knowledge?
- 4 What Will I Do to Help Students Generate and Test Hypotheses about New Knowledge?

# Phases of Implementation



-  What Will I Do to Establish and Communicate Learning Goals, Track Student Progress, and Celebrate Success?
- Make a distinction between learning goals versus learning activities or assignments.
  - Write a rubric or scale for each learning goal.
  - Have students identify their own learning goals.
  - Assess students using a formative approach.
  - Have students chart their progress on each learning goal.
  - Recognize and celebrate growth.

**Learning Goals**

**Action Step:**      Make a distinction between learning goals versus learning activities or assignments.

**Activities/Assignments**

Today

Read Chapter 2 in ..

Finish Adverb assignment...

Work on myth..

✓

✓

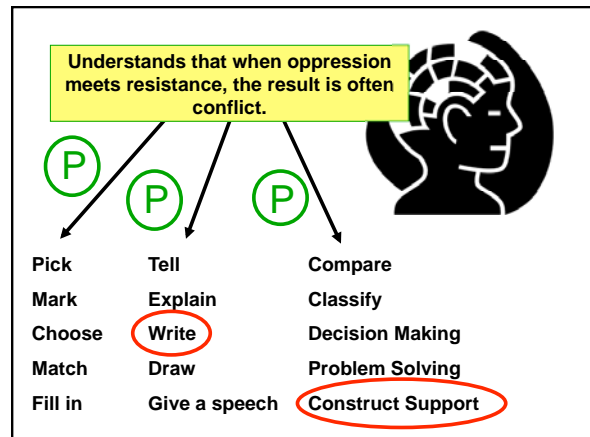
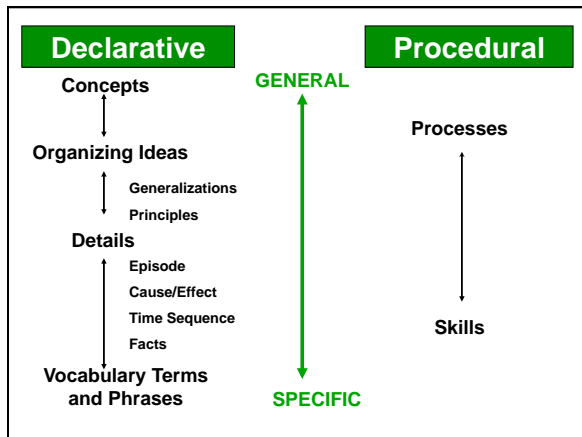
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**Learning Goals**

*As a result of what we do today, you will be able to demonstrate that you:*

*Understand the technique of foreshadowing in mysteries.*

*Can revise writing to improve use of descriptive adverbs.*



# Rubric

**Action Step:** Write a rubric or scale for each learning goal.

Score	Scale for Scoring Assessments
4.0	In addition to Score 3.0 performance, in-depth inferences and applications that go beyond what was taught.
3.0	No major errors or omissions regarding any of the information and/or processes (simple or complex) that were explicitly taught.
2.0	No major errors or omissions regarding the simpler details and processes but major errors or omissions regarding the more complex ideas and processes.
1.0	With help, a partial understanding of some of the simpler details and processes but not the more complex ideas and processes.
0.0	Even with help, no understanding or skill demonstrated.

Score	Scale for Scoring Assessments
4.0	In addition to Score 3.0 performance, in-depth inferences and applications that go beyond what was taught.
3.0 (Complex)	Uses commas with cities, states, dates, and addresses Correctly uses capitalization for holidays and historical periods Correctly uses abbreviations
2.0 (Simple)	Recognizes and recall vocabulary terms: city, state, and date Recognizes correctly punctuated cities, states, dates, and addresses Recognizes correct capitalization involving holidays and historical periods, Recognizes correct common abbreviations
1.0	With help, a partial understanding of some of the simpler details and processes but not the more complex ideas and processes.
0.0	Even with help, no understanding or skill demonstrated.



4.0	In addition to Score 3.0 performance, in-depth inferences and application that go beyond what was taught.
3.5	In addition to 3.0 performance, partial success at inferences and applications that go beyond what was taught.
3.0	No major errors or omissions regarding any of the information and/or processes (simple and complex) that were explicitly taught.
2.5	No major errors or omissions regarding the simpler details and processes and partial knowledge of the more complex ideas and processes.
2.0	No major errors or omissions regarding the simpler details and processes but major errors and omissions regarding the more complex ideas and processes.
1.5	Partial knowledge of the simpler details and processes but major errors and omissions regarding the more complex ideas and processes.
1.0	With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.
0.5	With help, a partial understanding of some of the simpler details and processes but not the more complex ideas and processes.
0.0	Even with help, no understanding or skill demonstrated.

# Student Goals

**Action Step:** Have students identify their own learning goals.

6 <sup>th</sup> Grade Science Unit		Name <u>Hector Reyes</u>
Topic	Teacher Learning Goals	My Learning Goals
<b>Composition and Structure of the Earth</b>	Understands how destructive forces create and change landforms Knows that weathering is a destructive force and that it can be found in different forms Understands that materials make up the earth's layers Knows the four layers of the earth Knows the characteristics of various landforms <u>Vocabulary Terms</u> crust, mantle, landform, erosion, weathering, rock, mineral, cone	<i>I would like to</i> <i>-Find out information about the different rocks and minerals and how they relate to the earth's layers</i> <i>-Find out why some minerals are worth more than others</i> <i>-Read some newspaper articles on hurricanes and how destructive they have been</i> <i>-Understand how weathering relates to the formation of the Grand Canyon</i>

Computer Class Name: Clarissa Mulboon

Teacher's Learning Goal	My Learning Goals
 <p>Understands basic ideas about networked computers.</p>	 <ul style="list-style-type: none"> <li>· <i>I want to know more about how a modem works.</i></li> <li>· <i>I want to know how our computer at home uses a high speed cable to connect to the Internet.</i></li> <li>· <i>I want to understand the difference between the "Internet" and an "Intranet."</i></li> </ul>

## Research Generalizations Reinforcing Effort

**Not all students realize the importance of believing in effort.**

**Students can learn to change their beliefs to an emphasis on effort.**

# Formative Approach

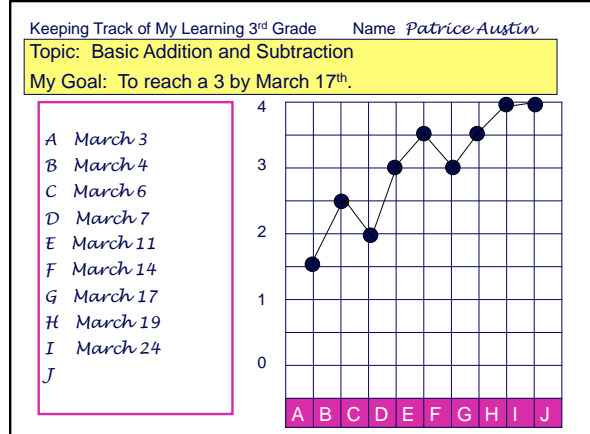
**Action Step:** Assess students using a formative approach.

*Like most things in education, classroom assessment enhances student achievement under certain conditions only (Marzano)*

1. **Feedback from classroom assessments should provide students with a clear picture of their progress on learning goals and how they might improve.**
2. **Feedback from classroom assessment should encourage students to improve.**
3. **Classroom assessment should be formative in nature.**
4. **Formative classroom assessments should be quite frequent.**

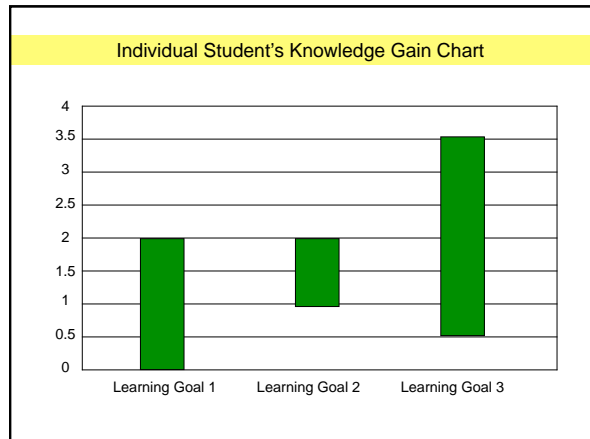
# Chart Progress

**Action Step:** Have students chart their progress on each learning goal.



# Celebrate Growth

**Action Step:** Recognize and celebrate growth.



Question 1: What will I do to establish learning goals, track student progress, and celebrate success?



**Ms. Kristi**  
3rd Grade

## Math: Geometry-Lines, Angles, and Geometric Objects K

### Standard: Geometry

<b>Complex</b>	<ul style="list-style-type: none"> <li>Describes and draws common geometric objects</li> <li>Sorts familiar plane and solid objects by common attributes (e.g., shape, size, number of corners)</li> <li>Creates new shapes by combining common geometric objects</li> </ul>
<b>Simple</b>	<ul style="list-style-type: none"> <li>Recalls/recognizes common geometric objects (e.g., circle, triangle, square, rectangle, cube, sphere, and cone)</li> <li>Recalls/recognizes common attributes (e.g., shape, size, number of corners) of familiar plane and solid objects</li> <li>Recalls/recognizes the following vocabulary terms: circle, triangle, square, rectangle, cube, sphere, cone</li> </ul>

<b>Math: Lines, Angles, and Geometric Objects 1st Grade</b>	
<b>Standard: Geometry</b>	
<b>Complex</b>	<ul style="list-style-type: none"> <li>Describes two or three dimensional objects (e.g., sides, corners, edges, faces)</li> <li>Classifies plane and solid objects by attributes and explain rule used (e.g. shape, size, roundness)</li> <li>Explains and models shape combinations by representing a three-dimensional shape with a two dimensional figure</li> </ul>
<b>Simple</b>	<ul style="list-style-type: none"> <li>Recalls/recognizes the attributes of plane and solid objects</li> <li>Recalls/recognizes the following vocabulary: attributes, side, corner, edge, face, plane figure, solid object, angle</li> </ul>

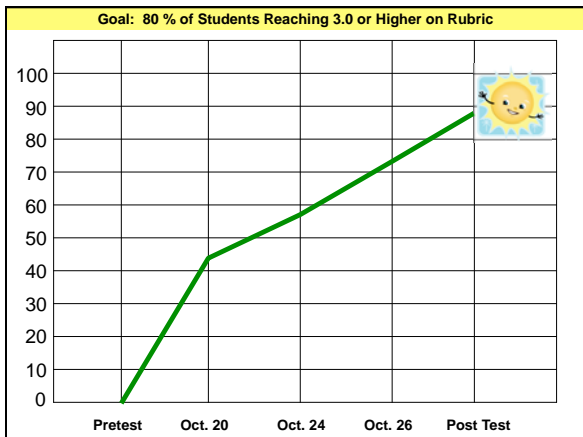
<b>Math: Lines, Angles, and Geometric Objects 2nd Grade</b>	
<b>Standard: Geometry</b>	
<b>Complex</b>	<ul style="list-style-type: none"> <li>Explains the differences between the basic attributes of two dimensional (plane) and three dimensional (solid) figures</li> <li>Demonstrates and explains how shapes can be put together and taken apart to form other shapes</li> <li>Sorts, describes, and analyzes plane and solid geometric shapes (e.g., circle, triangle, square, rectangle, sphere, pyramid, cube, rectangular prism) based on various attributes (e.g., faces, edges, and corners)</li> </ul>
<b>Simple</b>	<ul style="list-style-type: none"> <li>Recalls/recognizes that shapes can be put together and taken apart to form other shapes (e.g., two congruent right triangles can be arranged to form a rectangle)</li> <li>Recalls/recognizes the following vocabulary terms: rectangular prism, pyramid, depth</li> </ul>

<b>Math: Lines, Angles, and Geometric Objects 3rd Grade</b>	
<b>Standard: Geometry</b>	
<b>Complex</b>	<ul style="list-style-type: none"> <li>Demonstrates, explains, and identifies the attributes of geometric shapes including polygons and quadrilaterals (e.g., create a three dimensional object from a two dimensional representation of the object )</li> <li>Demonstrates and identifies the use of geometric shapes and structures in the classroom and the environment (e.g., locate right angles in the room)</li> <li>Demonstrates and explains right angles, lines, line segments, parallel lines, and perpendicular lines</li> </ul>
<b>Simple</b>	<ul style="list-style-type: none"> <li>Recalls/recognizes geometric shapes (e.g., pentagons, hexagons, octagons, rectangular solids, prisms, and cylinders)</li> <li>Recalls/recognizes right angles, lines, line segments, parallel lines, and perpendicular lines</li> <li>Recalls/recognizes the following vocabulary terms: horizontal, vertical, oblique, right angle, parallel, perpendicular, line, line segment</li> </ul>

<b>Math: Lines, Angles, and Geometric Objects 4th Grade</b>	
<b>Standard: Geometry</b>	
<b>Complex</b>	<ul style="list-style-type: none"> <li>Demonstrates and explains the steps required to draw geometric objects (e.g., parallelograms, rhombuses, trapezoids)</li> <li>Demonstrates and explains the basic distinctions between parallel, perpendicular and oblique lines</li> </ul>
<b>Simple</b>	<ul style="list-style-type: none"> <li>Recalls/recognizes that faces and edges create vertices on geometric objects</li> <li>Recalls/recognizes parallel, perpendicular and oblique lines</li> <li>Recalls/recognizes the following vocabulary terms: oblique, parallelogram, rhombus, trapezoid, vertices</li> </ul>

<b>Math: Lines, Angles, and Geometric Objects 5th Grade</b>	
<b>Standard: Geometry</b>	
<b>Complex</b>	<ul style="list-style-type: none"> <li>Demonstrates and explains properties of regular polygons having up to ten sides</li> <li>Explains by example the differences between right, acute, obtuse angles</li> <li>Explains by example the differences between right, acute, obtuse triangles</li> <li>Explains and models the steps needed to draw specific angle measurements</li> <li>Explains and models the steps needed to calculate the circumference, radius, and diameter of a circle</li> </ul>
<b>Simple</b>	<ul style="list-style-type: none"> <li>Recalls/recognizes polygons (up to ten sides)</li> <li>Recalls/recognizes various types of triangles (e.g., right, acute, obtuse)</li> <li>Knows how to measure angles, lines, and circles</li> <li>Recalls/recognizes the following vocabulary terms and phrases: circumference, radius, diameter, right, acute, obtuse</li> </ul>

TOPIC	Lines, Angles, and Geometric Objects
4.0	In addition to score 3.0, in-depth inferences and applications that go beyond what was taught
3.5	In addition to score 3.0 performances, the student makes in-depth inferences and applications with partial success
3.0	<ul style="list-style-type: none"> <li>Demonstrates, explains, and identifies the attributes of geometric shapes including polygons and quadrilaterals (e.g. creates a three dimensional object from a two dimensional representation of the object)</li> <li>Demonstrates and identifies the use of geometric shapes and structures in the classroom and the environment (e.g. locate right angles in the room)</li> <li>Demonstrates and explains right angles, lines, line segments, parallel lines, and perpendicular lines</li> </ul>
2.5	No major errors or omissions regarding the score 2.0 elements and partial knowledge of the score 3.0 elements
2.0	<ul style="list-style-type: none"> <li>Recalls/recognizes geometric shapes (e.g., pentagons, hexagons, octagons, rectangular solids, prisms, cylinders)</li> <li>Recalls/recognizes right angles, lines, line segments, parallel lines, and perpendicular lines</li> <li>Recalls/recognizes the following vocabulary terms: horizontal, vertical, oblique, right angle, parallel, perpendicular, line, line segment</li> </ul>
1.5	Partial knowledge of the score 2.0 elements but major errors or omissions regarding the score 3.0 elements
1.0	With help, a partial understanding of some of the score 2.0 elements and some of the score 3.0 elements.
0.5	With help, a partial understanding of some of the score 2.0 elements but not the score 3.0 elements.
0.0	Even with help, no understanding of skill demonstrated.



### Lines, Angles, and Geometric Shapes

**Rubric Level 2**

1. Write a brief description in your own words for the following vocabulary terms:

horizontal  
vertical  
oblique  
right angle  
parallel  
perpendicular  
line  
line segment

2. Circle the name of the following geometric shape:

A triangle  
B cone  
C cylinder  
D rectangular prism

3. Circle the letter that represents a true statement about the figures below.

**Figure X** **Figure Y**

A Figure X has more faces than Figure Y.  
B Figure Y has more vertices than Figure X.  
C Both figures have the same number of edges.  
D Both figures only have faces that are triangles.

4. A cube is pictured below. Circle the letter that shows the number of faces on a cube.

A 2 faces  
B 4 faces  
C 6 faces  
D 8 faces

5. Circle the letter that represents the figure that has exactly 4 sides and 4 vertices?

A   
B   
C   
D

6. Circle the letter that represents the best name for the figure below?

A right angle  
B acute angle  
C obtuse angle  
D triangle

**Rubric Level 3**

7. Draw and explain the characteristics of a right angle.

8. Draw and compare parallel lines and perpendicular lines.

9. Explain the difference between a line and a line segment, and give examples of each one.

10. Find three examples of geometric shapes in our classroom, and tell how they are used.

11.

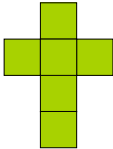
Write the letter of each polygon in the correct column on the chart below.

4 sides and angles	5 sides and angles	6 sides and angles	8 sides and angles

Write the name of each polygon shown above. Explain how you named each polygon using words.

A \_\_\_\_\_ D \_\_\_\_\_  
B \_\_\_\_\_ E \_\_\_\_\_  
C \_\_\_\_\_ F \_\_\_\_\_

12. Explain the shape that can be made by folding the following diagram on the lines.



Explanation: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

*Rubric Level 4*

13. Design a new geometric shape and explain what it can be used for.


14. Create two analogies for two geometric shapes.

\_\_\_\_\_ is to \_\_\_\_\_ AS \_\_\_\_\_ is to \_\_\_\_\_

\_\_\_\_\_ is to \_\_\_\_\_ AS \_\_\_\_\_ is to \_\_\_\_\_

15. Create a simple map by using both parallel lines and perpendicular lines.

Question 1: What will I do to establish learning goals, track student progress, and celebrate success?



**Mr. Snow**  
 8<sup>th</sup> Grade  
 Social Studies

Score	Rubric for Significant Individuals and Events
4.0	In addition to Score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was explicitly taught in class.
3.0	The student demonstrates an understanding of: <ul style="list-style-type: none"> <li>Understands that the use of atomic weapons still impacts the world today and that there is considerable controversy surrounding this issue.</li> <li>Understands the implications of various factors and events that contributed to the outbreak and end of World War II (e.g., the use of the atomic bomb)</li> </ul> <b>The student exhibits no major errors or omissions.</b>
2.0	The student demonstrates no errors or omissions regarding simpler details such as: <ul style="list-style-type: none"> <li>Recalls/recognizes the major events and people that led to the outbreak of World War II.</li> <li>Recalls/recognizes details related to the people and events leading to the dropping of the atomic bombs and the impact this had on the World War II and Japan.</li> <li>Recalls/recognizes vocabulary related to this topic (cold war, disarmament, reparations, nationalism, Treaty of Versailles, Allies).</li> </ul> <b>However, the student exhibits major errors or omissions with score 3.0 elements.</b>
1.0	With help, the student demonstrates a partial understanding of some of the simpler details but not the more complex ideas.
0.0	Even with help, no understanding is demonstrated.

Unit: Significant Individuals and Events Name \_\_\_\_\_  
*Fourth Period, Mr. Snow*

**Learning Goals**

*Students will know the vocabulary related World War II.*

*Students will recall/recognize the major events and people that led to the outbreak of World War II.*

*Students will know details related to the people and events leading to the dropping of the atomic bomb and impact this had on World War II.*

*Students will understand the implications of various factors and events that contributed to the outbreak and end of World War II.*

*Students will understand that the use of atomic weapons still impacts the world today and that there is considerable controversy surrounding this issue.*

**My personal learning goals for this unit:**  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Keeping Track of My Learning

Name: *Sean*  
 Measurement Topic: *Significant Individuals and Events*  
 My score at the beginning \_\_\_\_\_ My goal is to be at \_\_\_\_\_ by \_\_\_\_\_  
 Specific things I am going to do to improve:

4	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
1	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
0	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	a	b	c	d	e	f	g	h	i	j

a	f
b	g
c	h
d	i
e	j

## What do you think?

- If you were Ms. Kristi and Mr. Snow, how would you score yourself using the Teacher Scale?
- What recommendations would you give them if you were providing them feedback?



### What Will I Do To Help Students Effectively Interact with New Knowledge?

- Identify critical input experiences.
- Preview the content prior to a critical input experience.
- Organize students into groups to enhance the active processing of information.
- Present new information in small chunks and ask students for descriptions, discussion, and predictions.
- Ask questions that require students to elaborate on information.
- Have students write out their conclusions or represent their learning nonlinguistically.
- Have students reflect on their learning.

## Critical Input

**Action Step:** Identify critical input experiences.

### Examples of Critical Input Experiences

- Read a book/passage/article
- Listen to a lecture
- Observe a demonstration
- Be part of a demonstration
- Watch a video/DVD
- Engage in a simulation
- Listen to a guest presentation
- Go on a field trip

## Preview Content

**Action Step:** Preview the content prior to a critical input experience.

Prior to the actual critical input experience, **students** should be involved in some form of previewing activity that helps them think about the content they will encounter.


### Prepare Students for a Critical Input Experience

1. Help students make linkages or connections to prior learning experiences from class
2. Provide students with a brief summary (oral or written)
3. Have students preview the information (e.g., skimming)
4. Give students cues or clues related to what they will be learning
5. Give students advance graphic organizers (e.g. Thinking Maps)
6. Provide students with teacher-made notes
7. Use questions as a means to activate prior knowledge
8. Engage students in activities that help students think about what they already know about the content

Think About What They Already Know	
1. KWL chart	11. Introduce key vocabulary terms to make predictions
2. Brainstorming	12. Morning message and sharing
3. Think, pair, share discussions	13. Pictures/picture walk
4. Milling to music	14. Bulletin boards/ Display items
5. Cell phone buddies	15. Center exploration
6. Circle pairs	16. Sing a song
7. Anticipation guides	17. Play a game
8. Sticky note share	18. Response journal
9. Picture/photo share	19. Vocabulary previews
10. Draw/act out something you know about the topic	

## Active Processing


**Action Step:** Organize students into groups to enhance the active processing of information.



**Goal:**

- To guide students in determining the most important aspects or the critical learning experience
- To help students construct meaning

### Actively Process Information



To actively process information, macro-strategies must be employed (e.g., Reciprocal Teaching, SQ3R). Macro-strategies include the following sub-components:

1. Summarizing
2. Note taking
3. Non-linguistic representations
4. Questions
5. Reflection
6. Co-operative learning

## Small Chunks

**Action Step:** Present new information in small chunks and ask students for descriptions, discussion, and predictions.

## Ask Questions

**Action Step:** Ask questions that require students to elaborate on information.

## Non-linguistic

**Action Step:** Have students write out their conclusions or represent their learning non-linguistically.

<p><u>Mental Pictures</u></p> <p>Link Strategy Familiar Place Framework Rhyming Pegword Number/key word</p>	<p><u>Kinesthetic Representations</u></p> <p>Language-based hand signals Using body to create images Role Plays Five Finger Retell Using sand Musical movement Reader's theatre Charades Skywriting</p>
<p><u>Physical Representations</u></p> <p>Dioramas Mobiles Models Manipulative 3-D maps</p>	

<u>Graphic Organizers</u>	
<p>Time sequence Descriptive pattern Cause/effect pattern Generalization pattern Concept pattern Episode pattern Problem Solution Pattern Web Fishbone Sorting Tree Tree Map Box and Whisker Graph</p>	<p>Circle Map Time Line Continuum Story Map Venn Diagram Stem and Leaf KWL Chart Two or Three Column Chart Analogy chart Main idea/Supporting Details Flow Chart</p>

**Reflection**

**Action Step:** Have students reflect on their learning.

Identify one thing you already knew and one thing that was not new to you.

Describe something you found interesting.

Identify one thing that was confusing and try to clear up that confusion.

What strategies that you used were most effective in helping you learn?

What got in the way of your learning?

How did your efforts effect your overall learning experience? What would you do different next time?

**What Will I Do to Help Students Practice and Deepen Their Understanding of New Knowledge?**

- Provide students with tasks that require them to examine similarities and differences.
- Help students identify errors in thinking.
- Provide opportunities for students to practice skills, strategies, and processes.
- Determine the extent to which cooperative groups will be used.
- Assign purposeful homework that involves appropriate participation from the home.
- Have students systematically revise and make corrections in their academic notebooks.

Steps for constructing an analogy

**CREATING ANALOGIES**

1. Identify how the two elements in the first pair are related.
2. State the relationship in a general way.
3. Identify another pair of elements that share a similar relationship.

Analogies can help explain an unfamiliar concepts by making a comparison to something we understand.

hot is to cold

Relationship: opposites

night is to ???????

Relationship: opposites

What are the steps in creating a metaphor?

CREATING METAPHORS



1. Identify the important or basic elements of the information or situation with which you are working.
2. Write that basic information as a more general pattern by
  - replacing words for specific things with words for more general things;
  - summarizing information whenever possible.
3. Find new information or a situation to which the general pattern applies.



## Practice

**Action Step:** Provide students opportunities to practice skills, strategies, and processes.

## Co-operative Groups

**Action Step:** Determine the extent to which co-operative groups will be used.

## Homework

**Action Step:** Assign purposeful homework that involves appropriate participation from the home.

## Revise and Correct

**Action Step:** Have students systematically revise and make corrections in their academic notebooks.

## 4

What Will I Do to Help Students Generate and Test Hypotheses about New Knowledge?

- Teach students about effective support.
- Engage students in experimental inquiry tasks that require them to generate and test hypotheses.
- Engage students in problem solving tasks that require them to generate and test hypotheses.
- Engage students in decision-making tasks that require them to generate and test hypotheses.
- Engage students in investigation tasks that require them to generate and test hypotheses.
- Have students design their own tasks.
- Consider the extent to which cooperative learning structures will be learned.

## Effective Support

**Action Step 1:** Teach students about effective support.

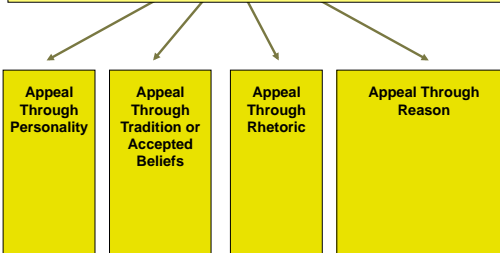


## Constructing Support

*Students need to understand the difference between a fact and an opinion and that there can be "false" facts.*

1. Identify whether you are stating facts or opinions.
2. If you are stating an opinion, determine whether the situation warrants support.
3. When the situation warrants it, construct a supportive argument through the use of a variety of devices, such as facts, evidence, examples, or appeals.

Opinion:



## Engage in Tasks

**Action Step:** Engage students in tasks that require them to generate and test hypotheses.



- Experimental Inquiry
- Problem Solving
- Decision Making
- Investigation

## Experimental Inquiry

**Action Step 2:** Engage students in experimental inquiry tasks that require them to generate hypotheses and test them.

## Problem Solving

**Action Step 3:** Engage students in problem-solving tasks that require them to generate and test hypotheses.

## Design Tasks

**Action Step 6:** Have students design their own tasks.

## Co-operative Learning

**Action Step 7:** Consider the extent to which co-operative learning structures will be used.



## Planning for Questions 2 - 4

**Ms. Kristi**  
Grade 3rd

### Action Steps That Cut Across All Three Instructional Questions

	Effectively Interact	Practice and Deepen	Generate/ Test Hypotheses
Co-operative Groups			→
Purposeful Homework			→
Reflect on Learning			→
Academic Notebooks			→

### THIRD GRADE MATH UNIT: Lines, Angles, and Geometric Objects

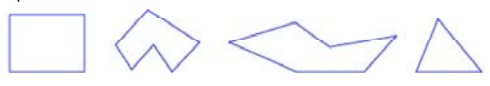
	Topic	Instruction	Formative Assessments
	Lines, Angles, and Geometric Objects		
COMPLEX	<ul style="list-style-type: none"> <li>Demonstrates and identifies the use of geometric shapes and structures in the classroom and the environment (e.g. locates right angles in the room)</li> <li>Demonstrates, explains, and identifies the attributes of geometric shapes including polygons and quadrilaterals (e.g., creates a three dimensional object from a two dimensional representation of the object)</li> <li>Demonstrates and explains right angles, lines, line segments, parallel lines, and perpendicular lines</li> </ul>	<ul style="list-style-type: none"> <li>Check on prior knowledge</li> <li>Six-step vocabulary</li> <li>Use web sites</li> <li>Create chart of geometric shapes</li> <li>Create non-linguistic representations of geometric shapes</li> <li>Create a three dimensional object from a two dimensional representation of the object</li> </ul>	
SIMPLE	<ul style="list-style-type: none"> <li>Recalls/recognizes geometric shapes (e.g., pentagons, hexagons, octagons, rectangular solids, prisms, and cylinders)</li> <li>Recalls/recognizes right angles, lines, line segments, parallel lines, and perpendicular lines</li> <li>Recalls/recognizes the following vocabulary terms: horizontal, vertical, oblique, right angle, parallel, perpendicular, line, line segment</li> </ul>	<ul style="list-style-type: none"> <li>Classify and re-classify geometric shapes</li> <li>Create analogies for geometric shapes</li> </ul>	




**Polygons** are two dimensional geometric figures







- straight line segments
- closed lines
- contain only an inside and an outside

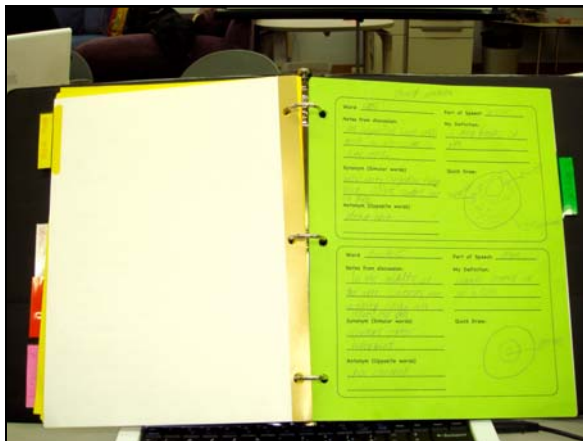
Examples

























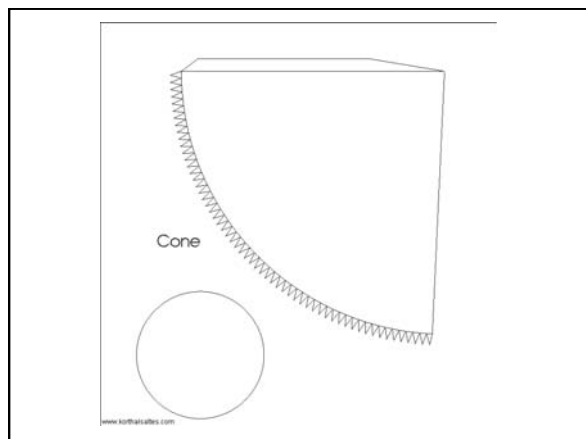
Non-Examples



Triangle	3	
Quadrilateral	4	
Pentagon	5	
Hexagon	6	
Heptagon	7	
Octagon	8	




Geometric Shapes						
One Dimensional		Two Dimensional			Three Dimensional	
Lines	Angles	Shapes	Polygons		Solids	
line 	right 	circle 	triangle 	Quadrilateral rectangle 	cone 	Rectangular prism 
line segment 		oval 	pentagon 	square 	cube 	pyramid 
parallel 		heart 	hexagon 	trapezoid 	cylinder 	
perpendicular 			octagon 	parallelogram 	prism 	



THIRD GRADE MATH UNIT: Lines, Angles, and Geometric Objects		
	Topic	Instruction
	Lines, Angles, and Geometric Objects	
COMPLEX	<ul style="list-style-type: none"> <li>Demonstrates and identifies the use of geometric shapes and structures in the classroom and the environment (e.g. locates right angles in the room)</li> <li>Demonstrates, explains, and identifies the attributes of geometric shapes including polygons and quadrilaterals (e.g., creates a three dimensional object from a two dimensional representation of the object)</li> <li>Demonstrates and explains right angles, lines, line segments, parallel lines, and perpendicular lines</li> </ul>	<ul style="list-style-type: none"> <li>Check on prior knowledge (<b>Question 2</b>)</li> <li>Six-step vocabulary (<b>Question 2,3</b>)</li> <li>Use web sites (<b>Question 2</b>)</li> <li>Create chart of geometric shapes (<b>Question 2</b>)</li> <li>Create non-linguistic representations of geometric shapes (<b>Question 2</b>)</li> <li>Create a three dimensional object from a two dimensional representation of the object (<b>Question 2</b>)</li> <li>Classify and re-classify geometric shapes (<b>Question 3</b>)</li> <li>Create analogies for geometric shapes (<b>Question 3</b>)</li> </ul>
SIMPLE	<ul style="list-style-type: none"> <li>Recalls/recognizes geometric shapes (e.g., pentagons, hexagons, octagons, rectangular solids, prisms, and cylinders)</li> <li>Recalls/recognizes right angles, lines, line segments, parallel lines, and perpendicular lines</li> <li>Recalls/recognizes the following vocabulary terms: horizontal, vertical, oblique, right angle, parallel, perpendicular, line, line segment</li> </ul>	

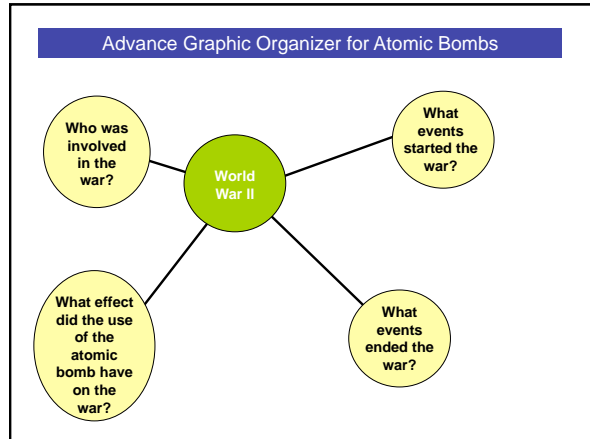
## Planning for Questions 2 - 4




**Mr. Snow**  
8<sup>th</sup> Grade  
Social Studies

### Critical Input Experiences

<ul style="list-style-type: none"> <li>Read a text</li> <li>Listen to a lecture</li> <li>Watch a video</li> <li>Watch a demonstration</li> <li>Engage in a simulation</li> </ul>	<ul style="list-style-type: none"> <li>Watch video from BBC broadcasting on Bombing of Nagasaki and Hiroshima</li> <li>Lecture on the major events leading to and people involved in World War II</li> <li>Read current newspaper articles on issues related to the use of nuclear bombs or weapons of mass destruction</li> </ul>
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### Critical Input: BBC Video



## Question

At the end of watching the video segments, each student was asked to respond to the following question:

*What were you right about in terms of your initial understanding of the events' at Hiroshima and Nagasaki?*


Their answers were recorded in their academic notebooks. Then students were asked to share what they had written with at least three other members of the class.

Step 1	Provide a description, explanation, or examples of the new term.
Step 2	Ask students to restate the description, explanation or example in their own words.
Step 3	Ask students to construct a picture, symbol, or graphic representation of the term.
Step 4	Engage students periodically in activities that help them add to their knowledge of the terms in their notebooks.
Step 5	Periodically ask students to discuss the terms with one another.
Step 6	Involve students periodically in games that allow them to play with terms.

Term Or Phrase	<i>disarmament</i>	
What I already know	What I am Learning	My Picture/Image
Examples		Non-Examples
My Definition		
Extending My Learning		
disarmament	:	as _____ : _____
disarmament	:	as _____ : _____
disarmament	:	as _____ : _____

**Critical Input: Lecture**

Mr. Snow decides it is time to provide students with a lecture on the causes of and incidents leading to World War II so they can better understand why the decision was made to drop the bombs.




Significant Events/Individuals	Teacher Notes	My Notes
	<p><b>World War II (1939-1945)</b></p> <p><u>Major Events</u></p> <ul style="list-style-type: none"> <li>• Hitler violates Treaty of Versailles (March, 1935)</li> <li>• Hitler invades Poland (Sept, 1939)</li> <li>• Britain, France, Australia, and New Zealand declare war on Germany (Aug, 1939)</li> <li>• Germany bombs Britain (Sept-Dec, 1940)</li> <li>• Germany attacks Soviet Union (June, 1941)</li> <li>• Japanese bomb Pearl Harbor (Dec, 1941)</li> <li>• USA and Britain declare war on Japan (Dec, 1941)</li> <li>• USA drops atomic bombs on Japan (Aug, 1945)</li> <li>• Japanese unconditional surrender (Sept, 1945)</li> <li>• United Nations is born (Oct, 1945)</li> </ul> <p><u>Reasons for WWII</u></p> <ul style="list-style-type: none"> <li>• Germany (Hitler), Italy (Mussolini), and Japan (Tajo) were aggressively invading other countries.</li> <li>• Initially the democratic powers were passive: USA (Franklin D. Roosevelt), France (Charles de Gaulle), Britain (Winston Churchill).</li> <li>• The League of Nations failed to keep peace and bring about disarmament <ul style="list-style-type: none"> <li>- not all countries joined</li> <li>- unable to act quickly</li> <li>- had no power or army</li> </ul> </li> <li>• All of the above countries were hostile to Communism (Stalin)</li> </ul> <p>Summary:</p>	

Topics	Significant Events/Individuals	Personal Economics	World Economics
Formative Assessments	(2.0)		
	1 2 3 4		
Students			
Ben	.5		
Marion	.5		
Jamal	2.0		
Sean	2.0		
Ashli	1.5		
Jessica	.5		
Rory	1.5		
Calene	1.0		
Brandi	1.0		

What are the steps in creating a metaphor?

**CREATING METAPHORS**



1. Identify the important or basic elements of the information or situation with which you are working.
2. Write that basic information as a more general pattern by
  - replacing words for specific things with words for more general things;
  - summarizing information whenever possible.
3. Find new information or a situation to which the general pattern applies.

Metaphor Task		
Bombing Japan	General Pattern	New Information
Japan felt like the US was taking over the Pacific.	Someone in power was concerned about others taking what was theirs.	
Japan wanted to maintain control of the Pacific islands.	They wanted to maintain control and gain more control.	
Japan decides to align with the Axis powers.	They aligned with other groups to get control.	
Japan attacks Pearl Harbor.	They attacked someone else.	
U.S. Declares War.	They, in turn, were attacked.	
U.S. drops bombs on Japan.		


Topics	Significant Events/Individuals				Personal Economics				World Economics			
	(2.0) 1	(3.0) 2	3	4								
Formative Assessments												
Students												
Ben	.5	1.5										
Marion	.5	2.0										
Jamal	2.0	3.0										
Sean	2.0	2.5										
Ashli	1.5	2.0										
Jessica	.5	2.0										
Rory	1.5	2.5										
Calene	1.0	2.0										
Brandi	1.0	1.5										

**Critical Input: Read Newspaper Articles**

You have been given a series of articles to read that identify countries in the world today that have conflicting opinions about their right to develop and/or use atomic weapons to defend themselves.

Using your reciprocal teaching groups, decide who will be the teacher and complete all of the steps in the reciprocal teaching process to help you process the information you are reading.

**Comparison Task**




Working with a partner, complete a comparison matrix that will help you identify how the countries in the articles are similar and different in their beliefs about the use of the atomic bomb in today's world. Identify the countries you have selected, the characteristics that you are examining, and the similarities and differences for each characteristic. Be prepared to share your comparisons with the class.

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Topics	Significant Events/Individuals				Personal Economics				World Economics			
	(2.0) 1	(3.0) 2	(3.0) 3	(4.0) 4								
Formative Assessments												
Students												
Ben	.5	1.5	3.0									
Marion	.5	2.0	3.0									
Jamal	2.0	3.0	3.0									
Sean	2.0	2.5	3.0									
Ashli	1.5	2.0	2.5									
Jessica	.5	2.0	3.0									
Rory	1.5	2.5	3.0									
Calene	1.0	2.0	3.0									
Brandi	1.0	1.5	2.0									

**Generating and Testing Hypotheses Task**



*The use of the atomic bomb on Hiroshima and Nagasaki was ultimately a value-laden decision made by a relatively small group of individuals. What do you think were the beliefs and values that drove this decision?*

*What do you think would have been the outcome of the war if the current president of the United States would have been the person making the decision? What do you think would be his beliefs and values regarding the use of atomic weapons and how would these effect his decision as to whether or not to drop the bomb?*

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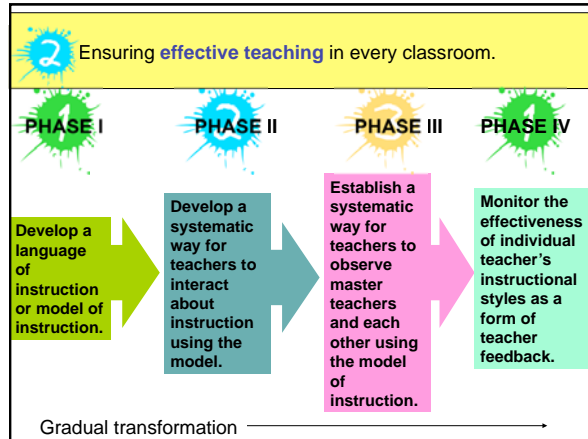
Topics	Significant Events/ Individuals				Personal Economics				World Economics			
	(2.0) 1	(3.0) 2	(3.0) 3	(4.0) 4								
Formative Assessments												
Students												
Ben	.5	1.5	3.0	3.5								
Marion	.5	2.0	3.0	3.5								
Jamal	2.0	3.0	3.0	4.0								
Sean	2.0	2.5	3.0	4.0								
Ashli	1.5	2.0	2.5	3.0								
Jessica	.5	2.0	3.0	3.5								
Rory	1.5	2.5	3.0	3.5								
Calene	1.0	2.0	3.0	3.5								
Brandi	1.0	1.5	2.0	3.0								

Questions.....

- How do we decide where to start?
- Do teachers need to plan for all four of the questions? What if they don't?
- Do the questions need to be addressed in a particular order?
- Do teachers need to complete all of the actions steps for each question they address?
- Do teachers need to create tasks for all of the complex reasoning processes identified in questions 3-4?

Some Advice.....

- Keep focused on whether or not students are learning. Don't make it about filling in a template or handing in a lesson plan.
- Take small steps so as to not overwhelm teachers. Build on what they already know and the current strategies they are using.
- Carve out time for professional learning experiences (See Implementation Phases II-IV).
- Keep in mind that this model is just a starting point for creating a model of instruction in your school/district.



1. Communicate Learning Goals, Track Progress, Celebrate Success	2. Effectively Interact With New Knowledge		3. Practice and Deepen Understanding	4. Generate and Test Hypotheses
Action Steps	Critical-Input Experiences	Action Steps	Action Steps	Action Steps
Make a distinction between learning goals versus learning activities or assignments	Identify critical-input experiences	Preview the content prior to a critical-input experience	Provide students with tasks that require them to examine similarities and differences (comparison, classification, analogies, metaphors)	Teach students about effective support
Write a rubric or scale for each learning goal	-Verbal	Organize students into groups to enhance the active processing of information	Help students identify errors in thinking	Engage students in tasks that require them to generate and test hypotheses (problem solving, experimental inquiry, decision making, investigation)
Have students identify their own learning goals	-Visual	Present new information in small chunks and ask for descriptions, discussions, and predictions	Provide opportunities for students to practice skills, strategies, and processes	Have students design their own tasks
Assess students using a formative approach	-Dramatic	Ask questions that require students to elaborate on information	Determine the extent to which cooperative groups will be used	Consider the extent to which cooperative learning structures will be learned
Have students chart their progress on each learning goal		Have students write out their conclusions or represent their learning non-linguistically	Assign purposeful homework that involves appropriate participation from the home	
Recognize and celebrate growth		Have students reflect on their learning	Have students systematically revise and make corrections in their academic notebooks	