Designing Coherent Instruction

Danielson Component 1e

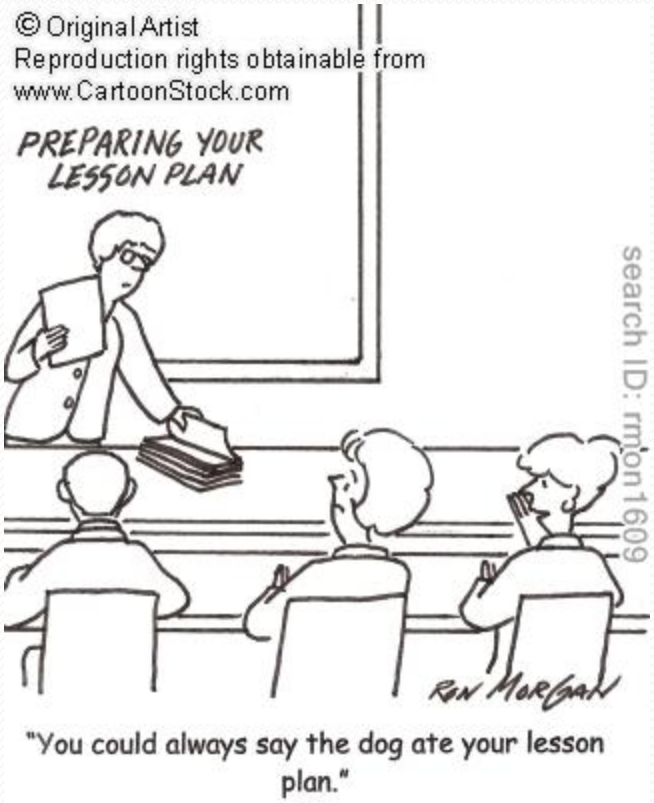
Using the CCLS and Danielson Improves Student Outcomes

Target group: **+21%**
With CCLS & Danielson

Average of 3 Other Groups: **+15%**
Without CCLS & Danielson

Throughout this presentation, samples will be provided from a CCLS-aligned "Seasons" unit that was shown, through the Inquiry Process, to improve student understanding as indicated by pre and post test scores.

Lesson Topic and Content Area Performance Standards



- Curriculum Mapping determines the topic for the given lesson.
- The topic determines the NY State Performance Standards for the lesson.

Use Backwards Mapping

Start with the Performance Task the students will be asked to do at the end of the unit.

Sample Performance Task from the "Seasons" Unit

"Seasons Explanation" Project

The Seasons Explanation Performance Task you previously wrote was for a quiz grade. The rubric (grading guide) used for your written explanation at that time was focused on your demonstration of an understanding of content (scientific facts). This assignment requires you to respond to the same Performance Task (New York State Regents multiple-choice question and following prompt), but will be focused on your **writing to explain** a complicated scientific concept. Your written explanation still needs to be scientifically accurate, but the rubric for the "Seasons Explanation" Project (on the back of this assignment sheet) awards many points for writing techniques as well, and should be used as a guide and a checklist. You will need to cite your notes taken in class (Meyer Class Notes, 2012), our textbook (Callister, 2011), our Barron's class handout (Denecke, 2006), and any other sources that you may choose to use. Any sources you cite in your essay will need to be in a bibliography that is attached to your essay. You are encouraged to use the "Causes of the Seasons Concept Map", Meyer's Sample "Seasons Explanation" Project Outline, the "Seasons Vocabulary List", the Barron's handout, the textbook (Callister, pgs. 105-109 and 116-118), and your notes. You can use the bibliography entries below if you cite any of these sources.

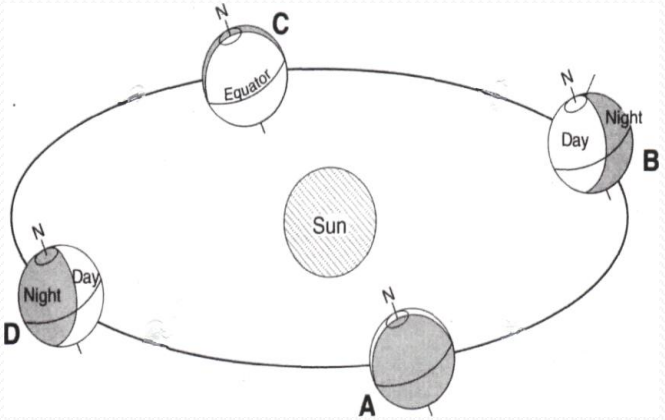
Causes of the Seasons sources

Callister, Jeffrey C. 2011. Prentice Hall Brief Review for the New York Regents Exam, Earth Science: the Physical Setting. Pearson Education, Inc.

Denecke, Edward J. 2006. Barron's Review Course Series, Let's Review: Earth Science, The Physical Setting. Barron's Educational Series, Inc.

Meyer, Pamela. 2012. Earth Science Class Notes. Herbert H. Lehman High School.

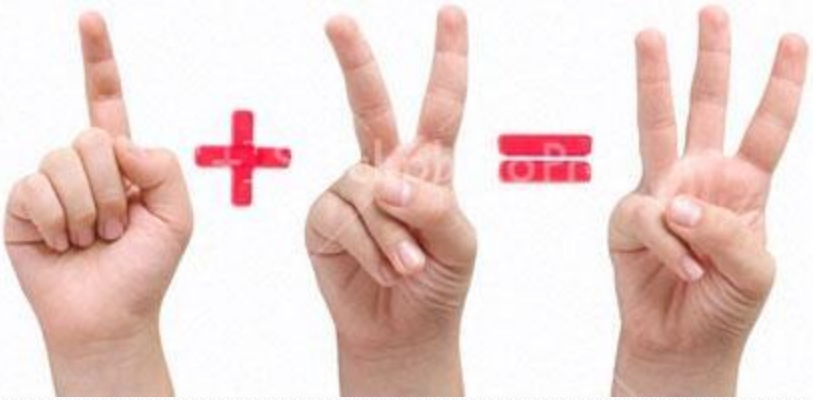
Multiple-Choice Question: The diagram below shows Earth's orbit around the Sun. Locations A, B, C, and D represent Earth on the first day of each season.



Which location (A, B, C, or D) represents March 21st?

(Essential Question) What causes Earth's changing seasons? After reading class texts, notes, and the multiple choice question and diagram above, write an explanation that, 1) describes how you can tell D represents our winter, 2) explains why the correct choice is A, 3) tells what thinking might mislead a student into choosing C, and 4) addresses the (essential) question.

What skills will the students need?

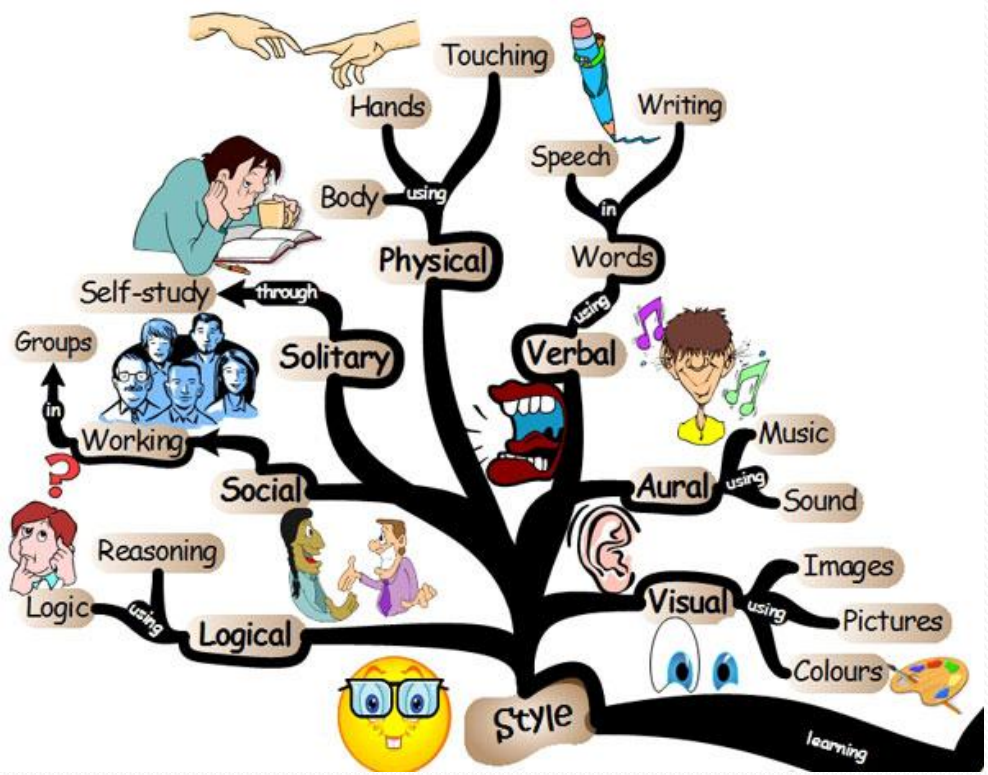


- Next, figure out what skills students will need to have developed in order to complete the Performance Task.
- The lesson plan should teach one, or some, of the skills needed to complete the Performance Task.

Coherent lessons coordinate content, resources, activities, and teacher knowledge of students

Competency		Ineffective	Developing	Effective	Highly Effective
1e: Designing Coherent Instruction **Elements:** *-Learning activities* *-Instructional materials and resources* *-Instructional groups* *-Lesson and unit structure*	Descriptor	The series of learning experiences is poorly aligned with the instructional outcomes and does not represent a coherent structure. The activities are not designed to engage students in active intellectual activity and have unrealistic time allocations. Instructional groups do not support the instructional outcomes and offer no variety.	Some of the learning activities and materials are suitable to the instructional outcomes, and represent a moderate cognitive challenge, but with no differentiation for different students. Instructional groups partially support the instructional outcomes, with an effort at providing some variety. The lesson or unit has a recognizable structure; the progression of activities is uneven, with most time allocations reasonable.	Teacher coordinates knowledge of content, of students, and of resources to design a series of learning experiences aligned to instructional outcomes and suitable to groups of students. The learning activities have reasonable time allocations; they represent significant cognitive challenge, with some differentiation for different groups of students. The lesson or unit has a clear structure with appropriate and varied use of instructional groups.	Plans represent the coordination of in-depth content knowledge, understanding of different students' needs and available resources (including technology), resulting in a series of learning activities designed to engage students in high-level cognitive activity. These are differentiated, as appropriate, for individual learners. Instructional groups are varied as appropriate, with some opportunity for student choice. The lesson's or unit's structure is clear and allows for different pathways according to diverse student needs.
	Critical Attributes	• *Learning activities are boring and/or not well aligned to the instructional goals.* • *Materials are not engaging or do not meet instructional outcomes.* • *Instructional groups do not support learning.* • *Lesson plans are not structured or sequenced and are unrealistic in their expectations.*	• *Learning activities are moderately challenging.* • *Learning resources are suitable, but there is limited variety.* • *Instructional groups are random or only partially support objectives.* • *Lesson structure is uneven or may be unrealistic in terms of time expectations.*	• *Learning activities are matched to instructional outcomes* • *Activities provide opportunity for higher-level thinking.* • *Teacher provides a variety of appropriately challenging materials and resources.* • *Instructional student groups are organized thoughtfully to maximize learning and build on student strengths.* • *The plan for the lesson or unit is well structured, with reasonable time allocations.*	*In addition to the characteristics of "Effective,"* • *Activities permit student choice.* • *Learning experiences connect to other disciplines.* • *Teacher provides a variety of appropriately challenging resources that are differentiated for students in the class.* • *Lesson plans differentiate for individual student needs.*

Scaffolding, Differentiation & Universal Design for Learning

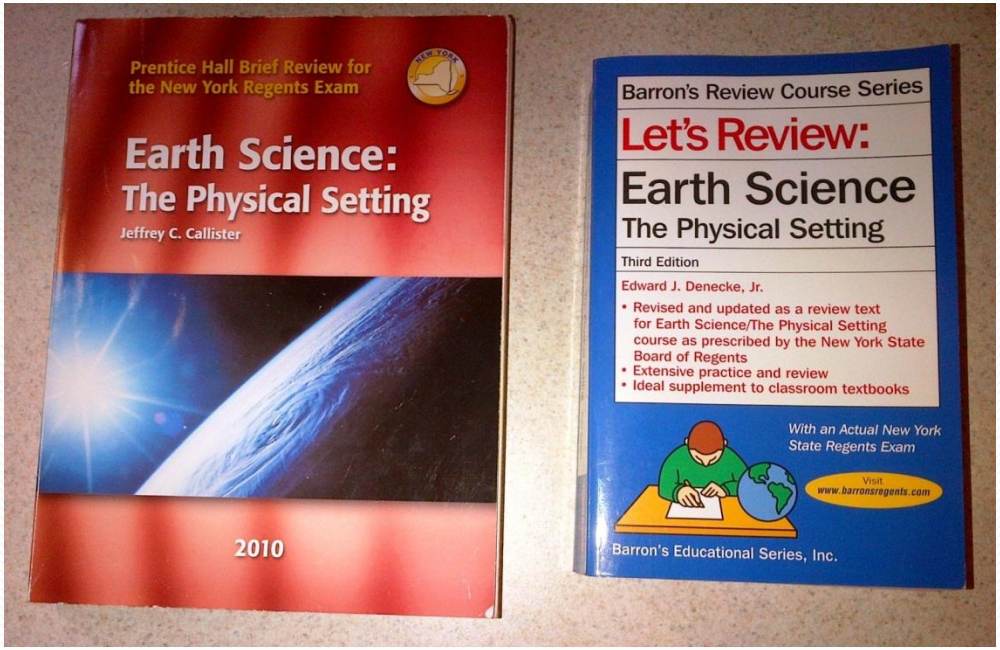


The lesson should be planned in order to provide access for ***ALL*** students to the skills being taught.

What can the teacher do in lesson planning to provide ways for all students to gain the skills and understanding necessary to complete the Performance Task?

- Provide a variety of options with different levels of difficulty
- Vary grouping patterns
- Annotate difficult vocabulary within a text
- Provide models/samples of expectations
- Provide visuals/graphics / 3-D models to complement texts
- Incorporate activities for kinesthetic learners
- Offer student choice in roles or in communicative style (draw vs. write) during “Do Now”, Activity, Assignments, and HW

Student Choice of Texts



6 reading level 4 (very complex)

6 reading level 3 (complex) [7th about NYC watershed]

4 reading level 2 (somewhat complex)

Make Different Versions of the Activity or Assignment (may require grouping students homogenously)

Name: _____

Measuring Earth's Orbit

- Draw 4 arrows, one between each of the 4 seasonal positions along Earth's orbit, indicating the direction of revolution.
- Fill in the dates for each of the 4 seasonal positions.
- Use a protractor to measure the degrees between the given seasonal dates, and record the data in the table
- What is the rate of revolution of Earth? (include the units) _____

Degrees/Time between Seasonal Dates

Between	# of degrees	# of days	# of months
winter - summer			
fall - spring			
winter - spring			
summer - fall			
winter - winter			

Name: _____

Measuring Earth's Orbit

- Draw 4 arrows, one between each of the 4 seasonal positions along Earth's orbit, indicating the direction of revolution.
- Fill in the dates and the name of the line of latitude that receives direct Sun for each of the 4 seasonal positions
- Use a protractor to measure the degrees between the given seasonal dates, and record the data in the table.
- Mark an 'X' on Earth's orbit to indicate Earth's approximate location today.
- What is the rate of revolution of Earth? (include the units) _____

Degrees/Time between Seasonal Dates

Between	# of degrees	# of days	# of months
winter - summer			
fall - spring			
winter - spring			
summer - fall			
winter - winter			

Model How it Can Be Done

I. Meyer's Sample "Seasons Explanation" Project Outline

A. Introduction: hot summer/cold winter
   1. The four seasons are due to differing strengths of the Sun throughout the year (citation needed)

B. Changing intensity of insolation due to changing angle of insolation (higher angle = stronger Sun) (citation needed)
   1. Shifting moisture belts as "the changing latitude of the Sun's vertical ray" (ESRT, p. 14) moves from equator up to Tropic of Cancer, back down to equator, down to Tropic of Capricorn, and returns to the equator throughout the year (citation needed)
      a. 90^0 Sun associated with a low pressure (warm and wet) moisture belt (citation needed)

C. 3 reasons the angle of insolation changes following this pattern (citation needed)
   1. Revolution of Earth around Sun (1^0 /day) (citation needed)
   2. Tilt of Earth's axis (23.5^0 off of the plane perpendicular to the Sun) (citation needed)
   3. Parallelism – North tip of axis aimed at Polaris, so the line of the axis at one given location is parallel to any other time in Earth's revolution (Denecke handout, 2006)

D. Revolution, tilt, and parallelism also cause changing duration of insolation following the same pattern (citation needed), creating longer days in summer and shorter days in winter

E. Conclusion – Knowing all these causes of the seasons, I can tell
   1. 'D' is winter because the direct rays of the Sun are aimed at the Tropic of Capricorn (citation)
   2. 'A' is March 21^{st} because spring comes after winter and the Earth revolves counter-clockwise
   3. The student mistakenly thought 'C' was spring because he/she thought the Earth revolved clockwise

Provide Visuals/3-D Models to Compliment Texts

"Seasons" Models

Kinesthetic Learners Thrive When Activities Require Them to Move

These students are “FEELING” what it is like to be aimed away from or towards the Sun.

Designing Activities with Roles: Student Choice (heterogeneous grouping)

Seasons Final Project: Diagrams Poster

Summer Solstice/Sun Artist: _____

Autumnal Equinox/Revolution Arrows Artist: _____

Winter Solstice/Diagrams Cutter: _____

Vernal Equinox/Diagrams Cutter: _____

1. Draw a small Sun in the center of the poster.
2. Draw a circle around the Sun to represent Earth's orbit, and draw 4 "direction of revolution" arrows in between the 12 o'clock, 3 o'clock, 6'oclock, and 9 o'clock positions.
3. Cut out the diagrams on both of the "Seasons Diagrams Poster Cut-Outs" sheets.
4. Place the "To Polaris" label in the correct upper corner. Work as a group to determine which diagrams are for the first day of each of the summer, fall, winter, and spring seasons.
5. Place the diagrams in the 12 o'clock, 3 o'clock, 6 o'clock, and 9 o'clock positions, with each student making sure that their season has the correct diagrams in the correct positions. Place the "Parallelism Globes" closest to the Sun, then "Shaded Globes", then "Solar Paths", and the "Duration of Insolation Graphs" farthest from the Sun. (Note the arrangement below)

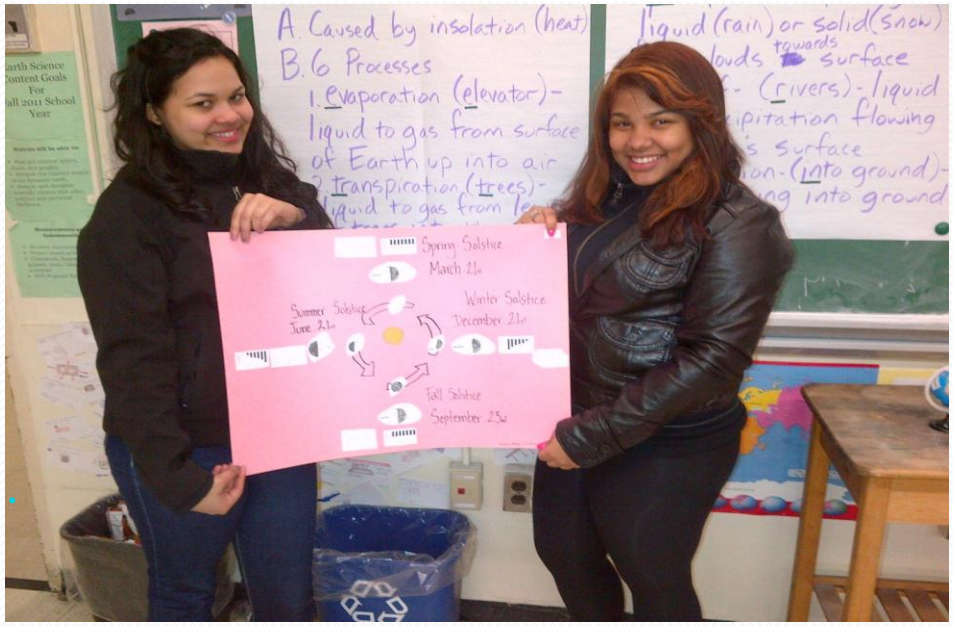
Graph
Solar Path
Shaded Globe
Parallelism Globe
(12 o'clock)

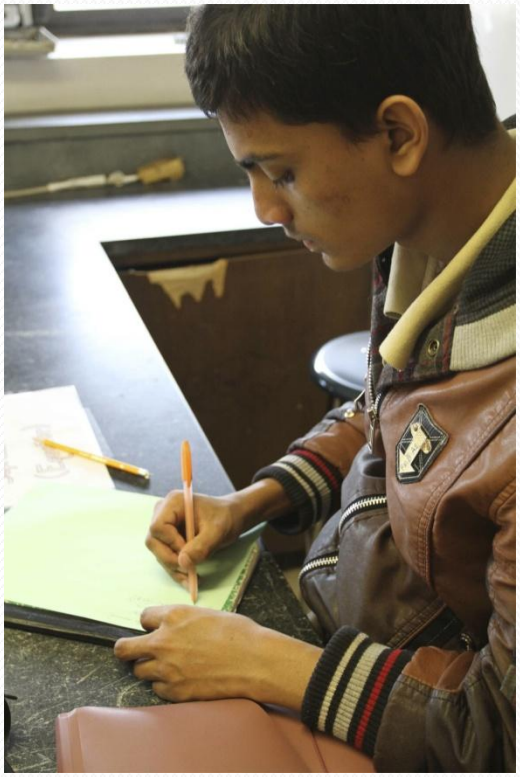
Graph/Solar Path/Shaded G./Parallelism G.(9) Sun (3)Parallelism G./Shaded G./Solar Path/Graph

(6 o'clock)
Parallelism Globe
Shaded Globe
Solar Path
Graph

6. Write labels for the first day of your season, including 1) the name, 2) the date, and 3) the latitude line that gets direct sunlight on that day.

Techniques like these provide access for ALL students to learn the skills needed to complete the Performance Task





*** Lessons that include means of differentiation will provide COHERENT INSTRUCTION for all.**