Supporting Deeper Learning

The Role of Common Core Standards in Transforming Teaching

Goal of Common Core Standards

- Fewer
- Higher
- Deeper

The Path to Deeper Learning: Metaphors from the Trenches

- He was as tall as a six-foot-three-inch tree.
- John and Mary had never met. They were like two hummingbirds who had also never met.
- She walked into my office like a centipede with 98 missing legs.
- He fell for her like his heart was a mob informant and she was the East River.
- Even in his last years, Grandpappy had a mind like a steel trap, only one that had been left out so long, it had rusted shut.
- He was as lame as a duck. Not the metaphorical lame duck, either, but a real duck that was actually lame.
- She grew on him like she was a colony of E. coli and he was room-temperature Canadian beef.
- The plan was simple, like my brother-in-law Phil. But unlike Phil, this plan just might work.
- Her vocabulary was as bad as, like, whatever.

What Deeper Learning is:

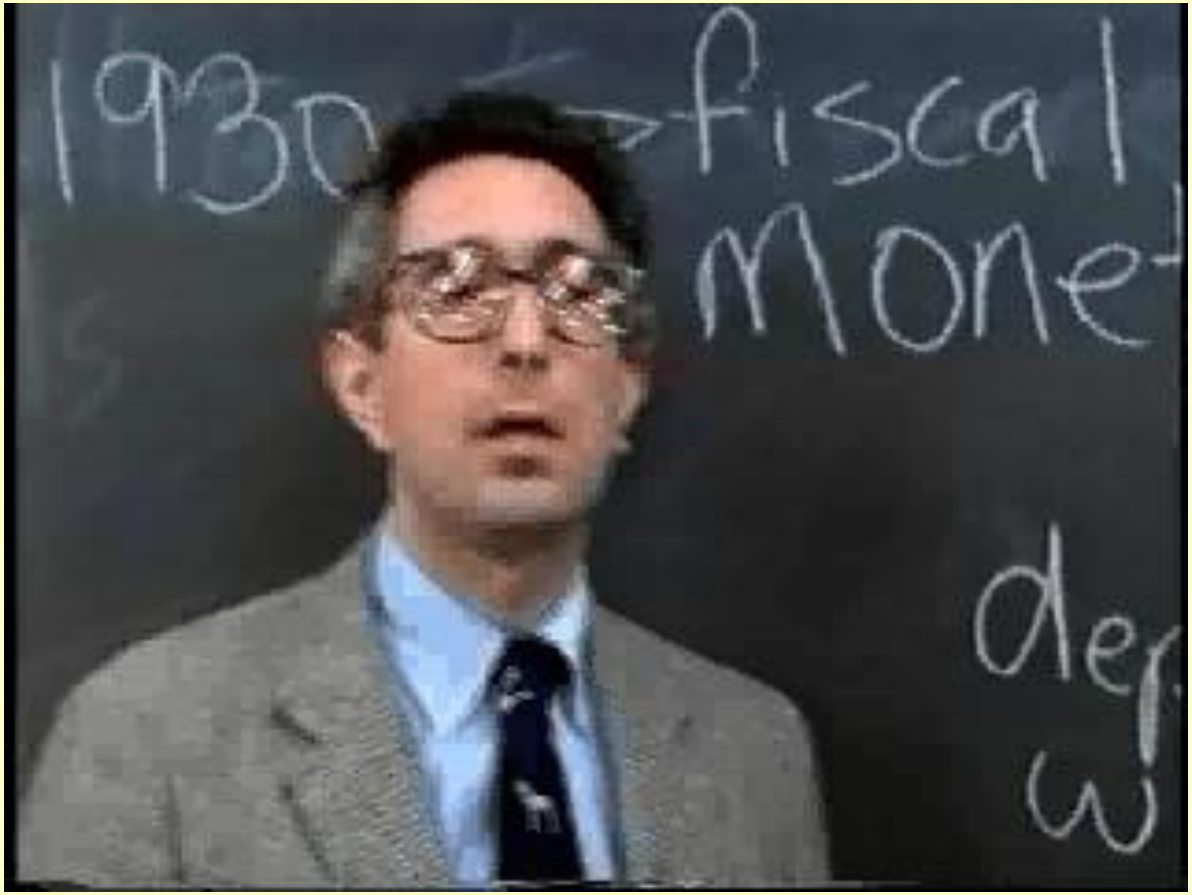
- An understanding of the meaning and relevance of ideas to concrete problems
- An ability to apply core concepts and modes of inquiry to complex real-world tasks
- A capacity to transfer knowledge and skills to new situations, to build on and use them
- Abilities to communicate ideas and to collaborate in problem solving.
- An ongoing ability to learn to learn

Key Aspects of the CCSS

- Reading increasingly complex texts closely
- Communicating effectively in multiple media and across content areas
- Using evidence; interpreting with justification
- Engaging in inquiry and research

- Engaging in mathematical practices that use mathematical reasoning in application
- Using mathematical skills across content areas and contexts

What Deeper Learning is Not



Measuring College- and Career- Readiness

Students are not entering a multiple choice world.

Genuine readiness for college and 21st century careers requires the ability to **find, evaluate, synthesize and use knowledge** in new contexts to frame and solve non-routine problems and produce new products.

This requires a base of robust, transferable – not inert – knowledge, deeply understood, organized around big ideas and the connections among them.

It also requires well-developed thinking, problem solving, design, and communication skills.

What Kind of Schools Can Create these Abilities?

Common Core Standards - Math

- Students should be able “understand,” “describe,” “explain,” “justify,” “prove,” “derive,” “assess,” “illustrate,” and “analyze.”
- They also need to be able to “model,” “construct,” “compare,” “investigate,” “build,” “interpret,” “estimate,” “summarize,” “represent,” “evaluate,” “extend,” and “apply” their learning to a wide range of real world problems – including uses in science, engineering, and technology problems

CST Math Item
Testing Standard 25.1

16 John's solution to an equation is shown below.

Given:	$x^2 + 5x + 6 = 0$
Step 1:	$(x + 2)(x + 3) = 0$
Step 2:	$x + 2 = 0$ or $x + 3 = 0$
Step 3:	$x = -2$ or $x = -3$

Which property of real numbers did John use for Step 2?

A multiplication property of equality

B zero product property of multiplication

C commutative property of multiplication

D distributive property of multiplication over addition

CSA20034

Stackable Chairs (Queensland, AU)

The scenario

The school plans to buy enough stackable chairs to allow all students and staff a chair during school assemblies. A practical storage area for the chairs must be found.

Modeling

Questions

1. Develop mathematical models for each dimension of a stack of chairs, where the number of chairs is unknown.
2. To help you think about the practicalities of storing chairs, use your mathematical models to find:
   a. the greatest number of chairs in one stack that can fit into a storage area with a 4 m high ceiling
   b. the number of stacks that fit across a 3.2 m wide area if there are 10 chairs in each stack
   c. the height of a stack, if all the chairs for the school are put into one stack.
3. Use the understanding of the practicalities of storing chairs you developed in Question 2 to find a practical storage area for the chairs.

To answer these questions, work through the steps set out on the following pages. As you work, record everything you do in your research journal.

Investigating

Using a research journal

A research journal is a record of what you and your group do.

Your research journal should include:

- what you and your group do in each class session
- ideas
- questions
- plans
- difficulties faced
- how difficulties are managed
- data collected
- calculations
- mathematical language
- acknowledgment of any help you receive from friends, teachers or other people.

Your research journal should contain all the information you need to write your report. It will also help your teacher decide what you can do by yourself, and what you can do as part of a group.

Explaining and Evaluating

Write a report on your investigation.

Your report should include:

- an introduction providing an overview of the scenario and the questions
- your solutions to the questions, using mathematical language, data, calculations, diagrams, graphs and phrases or sentences that provide enough information for a person to know what you are calculating without having to read the questions
- a conclusion, summarising:
  - your reflection on the practicalities of your solutions
  - any assumptions made or limitations to your answers
  - suggestions for improving the investigation or strategies used.

The written component of your report should be about three pages in length.

CCSS-ELA

- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on what is most significant for a specific purpose and audience.

Example of Teaching and Assessment Tasks: GCSE English (UK)

Unit and Assessment	Tasks
Reading literacy texts Controlled assessment (coursework)	Responses to three texts from choice of tasks and texts, interpreting texts in their social, cultural and historical context
Imaginative Writing Controlled assessment	Two linked continuous writing responses from a choice of Text Development or Media
Speaking and Listening Controlled assessment (coursework)	• A drama-focused activity; • A group activity; • An individual extended contribution. One activity must be a real-life context in and beyond the classroom
Information and Ideas Written exam	Non-Fiction and Media: Responses to passages Writing information and Ideas: One continuous writing response – choice from 2 options

CCSS – ELA Reading

Draw evidence from literary or informational texts to support analysis, reflection, and research.

CST ELA Item
Testing Standard 9RC2.8

18 **Which of the following statements from the passage supports the author's conclusion that carrier pigeons sometimes had a dangerous job?**

A In 1815 an English banker named Nathan Rothschild made his fortune by relying on messages sent to him by carrier pigeons.

B Since they could easily be released from airplanes or ships, every branch of the armed services used the birds.

C On his last mission, though wounded, he carried a message that saved the lives of 194 American soldiers.

D Many people find carrier pigeons ugly because of their big wattle, a knobby buildup of skin on the beak.

CSR11033276

Alberta, Canada Reading Task – Embedded in Science Content

Use the following information to answer the next question.

Autism is a complex behavioural disorder. The symptoms of autism vary greatly and occur in different combinations. Symptoms include a reduced ability to communicate, a reduced ability to develop relationships, difficulty coordinating facial muscles, and difficulty interpreting social cues.

In the late 1950s and early 1960s, the drug thalidomide was prescribed to pregnant women to combat morning sickness. Thalidomide was found to cause birth defects, such as stunted growth of the arms and legs. Some children also developed autism as a result of being exposed to thalidomide in utero. In comparison with the general population, the frequency of autism is many times higher in people with birth defects caused by thalidomide, which suggests that autism may originate early in embryonic development.

Time-Line of the Effects of Thalidomide on Embryonic Development

Age of embryo	20	21	22	23	24	25	26	27	28	29	30	31	32	33
	Nursing Mothers				Small ears and other malformations									
					Stunted arms									
							Stunted legs							

Scientists have genetically engineered mice that have symptoms similar to those of autism. These mice have a defective copy of the Hoxal gene, which is also present in humans, is normally active only during very early embryonic development.

Although people affected with autism are more likely to have the defective Hoxal gene than people without the disorder, the presence of the effective gene does not ensure the development of autism. Further investigation is required to determine whether enviromental factors work in conjunction with genes to produce autism.

Rodier, Patricia M. 2000. The early origins of Autism.
Scientific American, February, 56 -63

Time-Line of the Effects of Thalidomide on Embryonic Development - Continued

Identify two areas of the brain that can be affected in an individual with autism.

Explain the relationship between the areas of the brain identified and the symptoms of autism.

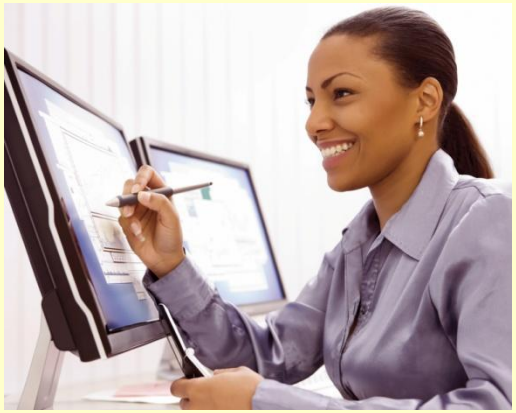
Identify one germ layer in which development could be disrupted by thalidomide and identify one structure that develops from this germ layer. Hypothesize how a person who has autism as a result of in utero exposure to thalidomide can have abnormal ear development but no malformations of the arms or legs.

Common Core Standards - ELA

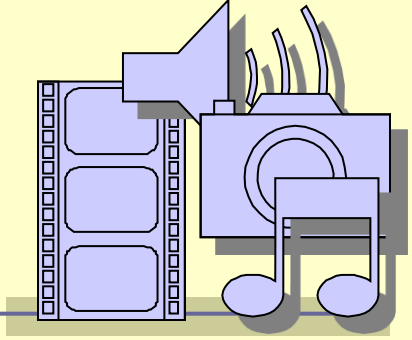
- Conduct short and sustained research projects to answer a question (including a self-generated question) or solve a problem; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- Present information, findings, and supporting evidence such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose and audience.

Common Core Standards - ELA

- Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
- Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.



GCSE ICT Task (England)



Litchfield Promotions works with over 40 bands to promote their music and put on performances in England. The number of bands they have on their books is gradually expanding. Litchfield Promotions needs to be sure that each performance will make enough money to cover all the staffing costs and overheads as well as make a profit. Many people need to be paid: the bands; sound engineers; and, lighting technicians. There is also the cost of hiring the venue. Litchfield Promotions needs to create an ICT solution to ensure that they have all necessary information and that it is kept up to date. Their solution will show income, outgoings and profit.

Candidates will need to:

1) Work with others to plan and carry out research to investigate how similar companies have produced a solution.

2) Clearly record and display your findings.

3) Recommend and evaluate a solution addressing the task requirements.

4) Produce a design brief explaining & critiquing your solution.

Key Issues to Wrestle With for Teaching and Assessing 21st Century Skills

- Developing higher-order thinking and problem-solving requires wider range of both teaching and assessment strategies
- Valuing assessment *of, for* and *as* learning requires new approaches to formative and summative assessment
- Systems must figure out how to integrate curriculum-embedded and "on-demand" assessments to develop and assess 21st century skills
- Curriculum expectations, instruction, assessment, and teacher development must be aligned in a teaching and learning system
- Engaging teachers in assessments is essential to improve their professional practice and capacity to support student learning