WELCOME

As much as possible, please sit in groups of six (6)

Thank You
Disciplinary Literacy in the Common Core Science and History Classroom

Arthur Beauchamp

Pam Tindall
Session Goals

• Consider what disciplinary literacy is in secondary science and history/social science classrooms.

• Experience practices for implementing the Common Core in secondary science and history/social science classrooms.

• Identify similarities and differences between disciplinary literacy instruction in both disciplines.

• Think about how to support content teachers as they amplify disciplinary literacy in instruction.
### Target Competencies

**Students Who Are College and Career Ready in Reading, Writing, Speak and Listening, and Language**

<table>
<thead>
<tr>
<th>• They demonstrate independence.</th>
<th>• They comprehend as well as critique.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• They build strong content knowledge.</td>
<td>• They value evidence.</td>
</tr>
<tr>
<td>• They respond to the varying demands of audience, task, purpose, and discipline.</td>
<td>• They use technology and digital media strategically and capably.</td>
</tr>
<tr>
<td></td>
<td>• They come to understand other perspectives and cultures.</td>
</tr>
</tbody>
</table>

**Small group discussion:** How do secondary science and history/social science help prepare these students?
Examine this through the lens of disciplinary literacy. How does it play out in the history/social science classroom? How does it play out in the science classroom?
“The world doesn't care what you know, but what you can do with what you know.”

~Attributed to Tony Wagner, a former high school teacher, now Harvard's first Innovation Education Fellow at the Technology & Entrepreneurship Center
WHAT DO HISTORIANS DO?
## How do different disciplines approach evidence?

<table>
<thead>
<tr>
<th>Science</th>
<th>History</th>
<th>English Language Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DO:</strong></td>
<td><strong>DO:</strong> Historical inquiry</td>
<td><strong>DO:</strong> Interpretation of literature</td>
</tr>
<tr>
<td>Experimental &amp;</td>
<td><strong>VALUE:</strong> Interpretation of</td>
<td><strong>VALUE:</strong> Divergent understandings</td>
</tr>
<tr>
<td>observational</td>
<td>evidence in light of its</td>
<td>of texts (evidence); aesthetic</td>
</tr>
<tr>
<td>inquiry</td>
<td>authors, biases, context;</td>
<td>qualities of text; note form and</td>
</tr>
<tr>
<td><strong>VALUE:</strong></td>
<td>compare and corroborate evidence</td>
<td>structure; etc.</td>
</tr>
<tr>
<td>Observable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>evidence; use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>process and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>predictability to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>test hypotheses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“In trying to make sense of the past, they [historians] disagree; so history is an unending argument about the nature of the past, a series of competing interpretations.”

~Robert Darnton,
Former President, American Historical Association
Overview: Common Core-aligned History Instruction

- **input**: Text: Reading & Listening

- **process**: evidence, reasoning, claims, argument

- **output**: Formal Expression: Speaking & Writing
“...A plausible and persuasive argument requires a clear, comprehensive and analytical thesis, supported by relevant historical evidence—not simply evidence that supports a preferred or preconceived position...”

~From the College Board: Historical Thinking Skills for AP U.S. History

http://apcentral.collegeboard.com/apc/members/exam/exam_information/224821.html
Developing a Thesis Statement

Our Question: Why Study History?

1. Review the available evidence. Consider what the question is asking and what the evidence reveals. Identify most relevant evidence

2. Organize the evidence

3. Develop a claim in response to the question

4. Write a thesis statement that states your claim
### How do different disciplines approach evidence?

<table>
<thead>
<tr>
<th>Science</th>
<th>History</th>
<th>English Language Arts</th>
</tr>
</thead>
</table>
| • **DO:** Experimental & observational inquiry  
  • **VALUE:** Observable evidence; use process and predictability to test hypotheses | • **DO:** Historical inquiry  
  • **VALUE:** Interpretation of evidence in light of its authors, biases, context; compare and corroborate evidence | • **DO:** Interpretation of literature  
  • **VALUE:** Divergent understandings of texts (evidence); aesthetic qualities of text; note form and structure; etc. |
WHAT DO SCIENTISTS DO?
“In trying to make sense of the natural world scientists observe, experiment, analyze, interpret and reason (make models) – and they disagree; so science is an unending argument about the veracity, analysis and interpretation of data.”

Sacramento Area science Project
SCIENCE INSTRUCTION FRAMEWORK

Puzzling and Engaging

PHENOMENA

Sometimes begin with a question

QUESTIONS

A Set of Ideas Based on Evidence

MODEL

REVISE

APPLY

DEVELOP

GENERATE

PURPOSEFUL READING

PRODUCTIVE DIALOGUE

MEANINGFUL WRITING
OBSERVATION OF PHENOMENA

• “Play” with the Newton’s Cradle for a minute and observe – look for patterns

• Develop a set of “rules” about how the cradle behaves – NOT why it behaves the way it does, just how it behaves (record your rules)

• You have 5 minutes
POTENTIAL RULES

• The distance a ball is pulled back before it is released has a direct relationship to how far the ball on the other end will move.

• One ball colliding = one ball departing, two balls colliding = two balls departing, etc.

• Others
Other Activities

\[
\begin{align*}
  v_1 &= \left( \frac{m_1 - m_2}{m_1 + m_2} \right) v \\
  v_2 &= \left( \frac{2m_1}{m_1 + m_2} \right) v
\end{align*}
\]
Development of a Question

• WHY does the Newton’s Cradle behave by the rules we think it does?

• This requires that we develop a causal explanation about how the cradle behaves – this is what scientists do.

• To develop an explanation we will be “modeling” – using ideas to understand how the cradle works.
Explaining Your Reasoning

• Using the Structured Think-Pair-Share....

• First, quietly and individually write down why you think the Newton’s Cradle works the way it does.

• Second, once you and your partner have finished writing, have a dialogue in which you will end up summarizing or paraphrasing your partner on your paper.

• Third, write down something you and your partner can share with everyone.
Processing Text – *Summary Protocol*

- Form groups of 3 or 4
- Designate a group leader – the leader helps the group stay on task and makes sure all contribute.
- Everyone silently reads the first paragraph.
- Once all are done, have a group dialogue about what each person thinks is main point(s) of the paragraph.
- Come to consensus.
- Write down the main point(s).
- Repeat for each paragraph of the reading.
Revisit Your Reasoning

• Using the Structured Think-Pair-Share....

• First, quietly and individually write down why you think the Newton’s Cradle works the way it does. Consider your experience, dialogue and the text.

• Second, once you and your partner have finished writing, have a dialogue in which you will end up summarizing or paraphrasing your partner on your paper

• Third, write down something you and your partner can share with everyone
Writing Your Explanation

• Literacy goals of the Common Core in science include equipping students to write scientific descriptions, explanations and arguments.
Novice to Expert Response

1. Don't believe that persistent analysis is essential, therefore effort and motivation to persist is weak.

2. Careless in their reasoning.

3. Don't break tasks into component parts and go step-by-step, therefore there are more errors.

4. Focus on individual details, and don't see how details relate to concepts, therefore, every concept feels new (overwhelming).

5. Formula-memorizing is a main strategy.

6. Often get behind in learning, and then sequential learning is hampered.

7. Loss of confidence in ability to achieve due to lack of success.
The Communication Triangle

Text Format: essay, news article, letter

Writer/Perspective: Who is speaking?

Reader/Audience: Who are you speaking to?

RAFT = Reader, Audience, Form, Topic
Potential Writing Tasks

• You are a writer for a student newspaper or blog at your school. A student named Becky has just sent you a question:

   Hi, my name is Becky and I am a 9th grader at this school. In science class the teacher has a Newton’s Cradle on the counter. Lots of kids play with it, but I want to know how it works. My friend says it is because of the Law of Conservation of Momentum, but I don’t understand what she means by that. Can you give me an explanation that I could understand?

• You are a physicist at UC Davis and a class of 8th graders is on a field trip in your department. One of the students sees a large Newton’s Cradle in the lab and asks why it works the way it does. Write your explanation to the 8th grader.

• You are a student in a college physics class. One of your classmates says that the most important piece of the explanation of how a Newton’s Cradle works is the Law of Conservation of Momentum. Would you agree with her or disagree with her? Cite evidence from text and your experience in your response.
Table Group Dialogue

1. Think of the science and history/social science activities – what did you do in these activities that was similar in nature?

2. How might you promote the use of cross-disciplinary practices in your setting?

3. How can a disciplinary literacy approach benefit the full range of students, EL to AP?

4. In what ways might you support disciplinary literacy at your site?
## Common Core

### Speaking and Listening:
- Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics and texts, building on others’ ideas and expressing their own clearly.

### Reading:
- Compare and contrast evidence or explanation presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

### Writing:
- Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
Implications for Science and History-Social Science

• Utilize a cognitive apprenticeship model
  – To organize instruction
  – As an approach to learning

• Make expert thinking and literacy practices, especially “the inner structure of argumentation or explanation,” visible

• Attend to Disciplinary Literacy—“Doing” what historians and scientists do (dialogue, reading and writing in their disciplines)
Resources

• Sacramento Area Science Project web site – http://sasp.ucdavis.edu

• Arthur’s email – acbeauchamp@ucdavis.edu

• UC Davis History Project web site – http://historyproject.ucdavis.edu

• Pam’s email – ptindall@ucdavis.edu

• Follow us on Facebook