

Intel® Teach Elements

Thinking Critically with Data

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Module 1: Information in Society and the Classroom

Lesson 1: Critical Thinking in the Digital Age

Activity 3: Critical Thinking

Estimated Time: 15 minutes

How do students access and use information and data in your class? Look over the Critical Thinking Skills document and record any of the skills or subskills your students use in your class in the space below.

My students ask a lot of open-ended questions about why things happened the way they did. They also gather facts. Cause and effect is another important skill in social studies, and I ask them to form their own opinions by evaluating others' arguments. They also have to analyze and synthesize information when they do research.

Module 1: Information in Society and the Classroom

Lesson 2: Critical Thinking about Data

Activity 4: Visual Representation

Estimated Time: 15 minutes

What activities in your classroom involve students using data? What kind of data do they use? How do they use the data? List the activities below.

We use quite a bit of data when we study economics. Students do oral reports on the economics of developing nations where they look at statistics online. We also look at statistics and demographics when we study the Industrial Revolution. We have a big timeline that goes around the room that describes the history of the United States, and students add representations of primary sources when possible to the timeline for each era.

Module 1: Information in Society and the Classroom

Lesson 3: Data Projects

Activity 2: Student-Centered Projects

Estimated Time: 15 minutes

Think about lessons or activities that you already do, or plan to do, that could be improved by incorporating the Data Project Process. Record your ideas below.

Timeline—I think we could do more with the timeline that we add to throughout the year. Learning about some of the time periods could work more as a research project than just as learning about the subject.

Maps—We could do some interesting things during our geography units with maps that show

different things about a country. Students could collect data and think of ways to show different aspects of a country through an illustrated map.

Industrial Revolution—I’m not too sure about how this would work, but there is quite a bit of statistical information about things like child labor, mass production, etc. and the Industrial Revolution. I’d like to do something more structured with the data rather than having students just read about it. This might even work as an inquiry project where they looked at some data and drew their own conclusions about the effect of industrialization.

Module 1: Information in Society and the Classroom

Lesson 4: Module Review

Activity 1: Module Summary

Estimated Time: 5 minutes

Reflect on your learning in this module.

In social studies, we do a lot of research about people, places, and past events. I like to approach teaching from broad themes rather than specific topics, and I can really see how adding more structured work with a broad range of data would help students improve their critical thinking. Instead of using primary sources like photos or documents as illustrations of what I’m trying to get across, I can see where students would benefit from thinking about what they mean. I’m not too sure how to go about that, but, hopefully, I’ll find out soon.

Module 2: Project Design for Critical Thinking

Lesson 1: Types of Projects

Activity 3: Collaborative Projects

Estimated Time: 10 minutes

Choose a unit to create or enhance through an emphasis on thinking critically with data.

Unit Description	Students will look at primary sources related to the experiences of immigrants to the United States. They will create some kind of a project around one person's experience.
Type of Project	This will be a descriptive project—probably a portfolio or Web site or something like that with several different parts.

Module 2: Project Design for Critical Thinking

Lesson 2: Learning Goals

Activity 2: Learning Objectives

Estimated Time: 10 minutes

Identify the standards you will address in your unit.

- Examine the reasons why people emigrated from their homelands to settle in the United States during the late nineteenth century.
- Formulate questions that can be answered by historical study and research data.
- Construct and interpret historical data displayed in graphs, tables, and charts.
- Determine the credibility and bias of primary and secondary sources.
- Analyze cause-and-effect relationships between and among individuals and/or historical events.

Write objectives related to content learning and data skills for your unit.

Students will be able to:

- Ask meaningful questions about the experiences and characteristics of immigrants that can be answered by primary sources and historical data.
- Conduct original research through interviews and observation, and analyze a variety of virtual and physical primary sources.
- Effectively record and display data in ways that show trends and patterns related to immigration.
- Use primary sources and available data to draw conclusions that describe the immigrant experience.

Module 2: Project Design for Critical Thinking

Lesson 3: Critical Thinking Assessment

Activity 1: Assessment of Data Processes

Estimated Time: 20 minutes

Describe how you will adapt and use different assessments of critical thinking.

Assessment	How You Will Adapt and Use It
Research Process Checklist	To describe the research process and help students keep track of their progress
Analysis Rubric	To help students self- and peer assess their analysis skills
Presentation Rubric	To help students as they work on their presentations and to assign a final grade

Module 2: Project Design for Critical Thinking

Lesson 4: Data Sources

Activity 2: Online Data Sources

Estimated Time: 20 minutes

Describe the data sources that will be most relevant for your students in your project.

Data Source	Where to Find	Student Support
Waves of Immigration	The Peopling of America	Research Process Checklist
National Origins	Immigration: The Living Mosaic of People, Culture, and Hope Immigration, Library of Congress	Data Collection Plan
Interviews	Family members, local immigrant advocacy organization	Artifact Analysis Worksheet

Module 2: Project Design for Critical Thinking

Lesson 5: Module Review

Activity 1: Module Summary

Estimated Time: 5 minutes

Reflect on your learning in this module. How might you use what you have learned in your teaching beyond the unit you have selected to target?

I can see lots of places where I could integrate lessons that involve thinking critically with data, even in units where students aren't doing a big project. We often look at demographic information and primary sources, so I could incorporate some of the components in those activities.

Module 3: Skills for Thinking Critically with Data

Lesson 1: Data Collection

Activity 3: Strategies for Accuracy

Estimated Time: 15 minutes

What specific research question(s) could your students develop? What strategies will you employ to help your students think more critically about the data they collect so that it is more accurate and free of bias?

Possible Research Questions

- What challenges did Chinese immigrants face in the 1860s and how did they meet those challenges?
- How did life change for Irish immigrants to the United States during the Irish Potato Famine?

Strategies

- Teach students to identify bias by hypothesizing alternate points of view or experiences to those they see in primary sources.
- Students will use a checklist to help them assess the credibility of immigration Web sites.

Module 3: Skills for Thinking Critically with Data

Lesson 2: Data Analysis

Activity 2: Patterns and Relationships

Estimated Time: 10 minutes

Recall Marzano's (2000) identification of the five ways of analyzing:

- Matching
- Classifying
- Error analysis
- Generalizing
- Specifying

What analysis skills do your students need to develop? How will you incorporate the organize-check-analyze process for data analysis? Add appropriate critical thinking skill and data analysis objectives to the ones you drafted in [Module 2, Lesson 2, Activity 2](#).

Module 3: Skills for Thinking Critically with Data

Lesson 3: Conclusions

Activity 2: Common Errors in Data Interpretation

Estimated Time: 20 minutes

Draft your plans for how your students will organize, check, analyze, and draw conclusions using data.

Data Interpretation Step	Plans for Student Process
Organize	Data Collection Plan
Check	Data Collection Plan
Analyze	Analysis Rubric
Draw Conclusions	Presentation Rubric

Module 3: Skills for Thinking Critically with Data

Lesson 4: Research Outcomes

Activity 2: Research Cycle

Estimated Time: 15 minutes

How might you build on the learning from your project to help your students continue asking questions and develop a deeper understanding of the subject matter?

We'll finish the unit by discussing the question, "Why take the risk?" to encourage students to connect what they have learned. I'll reinforce learning about immigration in future units on industrialization and World War I.

Module 3: Skills for Thinking Critically with Data

Lesson 5: Module Review

Activity 2: Module Summary

Estimated Time: 5 minutes

Reflect on your learning in this module.

It was good for me to think about the specific skills that are involved in thinking critically. It really helps me focus on what kids need to learn.

Module 4: Tools for Effective Data Analysis

Lesson 1: Data Organization with Technology

Activity 2: Data Organization

Estimated Time: 15 minutes

How will your students collect and sort data? What skills will they need to develop?
How will this process fit into the overall project? Record your thoughts below.

How will students collect and sort data?	They'll take notes in spreadsheets or on note cards if they prefer.
What skills will they need? How will they be taught?	I'll give mini-lessons on creating categories and modifying them as they collect more data. They'll also need some instruction in sorting data.
How will these activities be integrated into the project?	<ol style="list-style-type: none">1. Mini-lesson on ways they can take notes before they start collecting data. Look at a sample of their notes to give feedback while they're working.2. Mini-lesson on modifying and generating categories for their data after they've worked a day or two.3. Model how to sort data using a spreadsheet or note cards.

Module 4: Tools for Effective Data Analysis

Lesson 2: Visual Presentation of Data

Activity 3: Conceptual Data Displays

Estimated Time: 10 minutes

How might students display their data during your project to share their conclusions?
What skills will you need to teach your students so they can display their data effectively?

How will students display their data?	They'll need a combination of timelines, charts, and graphs.
What skills will they need? How will they be taught?	I'll model some different kinds of visual displays—charts, timelines, and some more graphic ways of showing data. I think I'll also do a mini-lesson on some ways to be creative to help them think of novel ways to share their findings.

Module 4: Tools for Effective Data Analysis

Lesson 3: Results with Technology

Activity 2: Tools for Data Presentation

Estimated Time: 10 minutes

What online tool(s) would you like to investigate for your students to use?

Online Tool	URL	Possible Use
Many Eyes	Manyeyes.com	Students might use it to show the paths that different immigrants took once they entered the United States. I'm sure that students might find other ways to use this tool to make their projects more interesting.
Tableau Public	Tableausoftware.com	I have some students who are pretty advanced technologically, and I think they would like to experiment with this site. Maybe they can even teach some other students (and me) ways to use it.

Module 4: Tools for Effective Data Analysis

Lesson 4: Showing Evidence

Activity 2: Showing Evidence Examples (Optional)

Estimated Time: 15 minutes

If you decide to use the *Showing Evidence Tool*, what prompt could you use? What type of evidence will your students use?

Showing Evidence Prompt	Should the United States create an amnesty law for immigrants who are in the country illegally?
Type of Evidence Required	<ul style="list-style-type: none">• Demographic information about immigration• Statistical evidence—costs and contributions to economy• Government policies

Module 4: Tools for Effective Data Analysis

Lesson 5: Module Review

Activity 2: Module Summary

Estimated Time: 5 minutes

Reflect on your learning in this module.

It's very exciting to learn about all the different kinds of tools that are available online to help students think about their data. The tools present some challenges for me, but I think students would find them to be interesting.

Module 5: Critical Thinking and Instruction

Lesson 1: Data Skills Instruction

Activity 5: Mini-Lessons and Critical Thinking

Estimated Time: 10 minutes

Identify some skills that you might teach with mini-lessons at different stages of your unit. As appropriate, include instruction in metacognition, data analysis, and drawing conclusions.

Stage of Unit	Skills to Teach
Immigration Waves	Finding patterns in a timeline of immigration waves
Interviews	Writing interview questions and conducting interviews
Collect Data	Determining point of view of a primary source and hypothesizing alternate points of view
Analyze Data	<ul style="list-style-type: none">• Categorizing data• Review finding patterns• Demonstrate metacognition about analyzing data and have students do think-alouds with each other
Wrap-Up	Reflection—looking back at thinking and collaboration skills they used and set goals for improvement

Module 5: Critical Thinking and Instruction

Lesson 2: Management of Projects with Data

Activity 2: Self-Direction

Estimated Time: 15 minutes

If your unit is a group project, describe how you will manage collaboration. If you are not planning a group project, how will you manage collaboration in general in your classroom?

If some students decide to do the project as a group, they could create a project plan dividing up different areas of immigration to study. Students could use a wiki to post their interviews and add their data to an online spreadsheet. I would also ask them to create a project plan to keep everyone on track.

As they work on the project, I will do mini-lessons on collaboration skills like compromise and effective leadership to help them be successful.

Module 5: Critical Thinking and Instruction

Lesson 3: Data Collection in the Field

Activity 1: Fieldwork

Estimated Time: 20 minutes

What kinds of fieldwork, if any, will your students be doing in your unit?

Students will be interviewing immigrants and immigrants' family members and examining artifacts of immigration experiences.

How will you prepare your students for successful fieldwork in a unit you teach?

- Teach interviewing skills with modeling, role-playing, and peer feedback.
- Practice examining artifacts in the classroom.

What potential problems do you see in your project and how will you address them?

Potential Problems	How You Will Address
Students don't know any immigrants.	Arrange interviews with a local immigrant group advocacy organization.
Students don't have access to transportation.	Set up Skype in the library or classroom for virtual interviews.
Students can't find artifacts.	Provide links to online primary sources and make arrangements with a local museum for students to view archives.

Module 5: Critical Thinking and Instruction

Lesson 4: Module Review

Activity 1: Module Summary

Estimated Time: 5 minutes

Reflect on your learning in this module. How will you successfully manage your students' projects with data inside and outside the classroom?

I like this practical information. I'm glad that I don't have to deal with complicated, expensive equipment like science teachers, but my students have to deal with people outside the classroom. This can be a good experience for everyone, but it will take a lot of planning and monitoring to pull it off. These hints will help.

Course Wrap-Up

Summary

Estimated Time: 15 minutes

How will you use the ideas presented in the course?

I like thinking of things like maps, diaries, and official documents as data. It's a way of seeing what my students do as being more like what historians do. They're using this data to create historical perspectives and artifacts, instead of just consuming what other people have said about history. It's exciting and really gives me an opportunity to focus on the kinds of critical thinking that historians do, which is really all about living in a world where we learn from the past. This is why I went into history and why I think it's so important.