Online Supplemental Materials for

Lateral Reading on the Open Internet: A District-Wide Field Study in High School Government Classes

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Journal of Educational Psychology

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Sample Lesson Plan

Lesson #3: Lateral vs. Vertical Reading

The Problem:
So far, students have been introduced to and practiced the strategy of *reading laterally*— leaving a website in order to investigate what other sources say about it. This strategy may be very different from the online evaluations that students have learned and practiced in the past. Students may be prone to read *vertically*—to make judgments based on features internal to website like its URL, design, functionality, or contents. However, these features are not effective ways to evaluate a site and need to be explicitly challenged.

This lesson provides students with more practice reading laterally and explicitly contrasts what they can learn about a website from reading laterally with what they can learn by reading vertically (staying inside the site and making evaluations based on features like appearance, design, or contents).

Materials:

- Copies of or link to Guiding Questions for students
- Computers for students (groups may share, if necessary)

Lesson Summary:

1. Review lateral reading and introduce focus on investigating authority and perspective
2. Evaluate a website by reading vertically (teacher demonstrates) and then reading laterally (students practice in groups)
3. Evaluate a social media post by reading vertically (teacher demonstrates) and then reading laterally (students practice in groups)

Lesson Plan:

1. Introduction to lesson: *In our last 2 lessons about online reasoning, I introduced you to a strategy for investigating who is behind information: lateral reading. When we read laterally, we leave a website that we don't know and open new tabs in order to see what other websites say about the original website.*
    a. *Ask students, what information do we need about an author or organization to help us decide if they are trustworthy to provide information on the topic at hand?*

   b. Prompt students to share their thinking. Help them consider multiple aspects about a source, including the sponsoring organization or author's perspective, authority or expertise, and potential motivations for providing the information.
   c. Explain: *Our goal in reading laterally is to learn more about a website's perspective, authority, and potential motivations for providing the information. A source might have a strong perspective and very little authority, or it might have a balanced perspective and very high authority, etc. We can use that information to form an initial judgment about how reliable it is as a source on the topic at hand.*
   d. *Information about an organization won't always be easy to find online, and we might not get exact answers. However, we can learn more about these things when we read laterally than we would if we tried other ways of evaluating websites.*
   e. *Don't take my word for it. Today we're going to contrast what we learn from lateral reading with what we learn from other ways of evaluating online information.*
2. Solicit ideas for vertical reading by asking students: *If we weren't going to read laterally—if we were just going to stay on a website and try to evaluate it based on what we see on the site—what would you do?*
   a. Encourage students to come up with as many ideas as they can. Ideas include: the website's URL, the design of the site (colors, organization, fonts, etc.), the presence of advertisements, whether there is a named author or publication date, and whether the contents of the article seem correct.
      i. **Note:** Since you already taught the first "Lateral Reading" lesson where students completed the "Article Evaluation" assessment with minimumwage.com, you could display sample responses that inappropriately judged the website based on features on the page like its appearance. You could then use those responses as a basis for discussion instead of asking students to generate ideas.
   b. Once you've generated a list with students, say the following: *Today, we're going to see what we learn from staying on the webpage and trying to evaluate it (vertical reading) and how that compares with what we can learn from lateral reading.*
3. Pass out Guiding Questions and display the website https://www.againstmalaria.com.
   a. Demonstrate vertical reading. **Note:** We refer to this as "demonstrating" instead of "modeling" since the process you are showing students is not actually one that you want them to learn. Instead, this part of the lesson is meant to surface inappropriate ways of evaluating websites that students may use to explicitly debunk them and show students why lateral reading works. You may raise the following points about the website:
      i. URL is ".com," which might raise suspicions—students may assume that .org URLs are automatically more reliable than .com websites.
      ii. Website appearance is relatively simple and not necessarily professional. Students might assume that a website's appearance is directly related to its reliability—the more professional or complex, the more reliable the site.
      iii. Language on website includes short, simplistic bullet points and a simple tally of the money raised and bug nets donated. Students might assume that

simplistic, straightforward language or lack of detailed information means the website might be less reliable.

iv. The website draws attention to the "Fundraise" and "Donate" tabs by making them red and highlighting them with arrows that read "How you can help!" Students might assume that a website that directly asks for money is less reliable.

b. After you're done, ask students:
   i. *What did we learn about the organization behind this information? Do we know anything about their perspective* (e.g., do they have a strong perspective, other than being against malaria)*? About how authoritative they are* (e.g., whether they are likely to provide accurate information about malaria and treatments for it)*?*
      1. Students should conclude that you did not learn anything about the source's perspective or authority.
   ii. *If we had to decide right now, how would we decide how reliable this site is as a source of information?*
      1. Because they've learned almost nothing about the website's perspective and authority, students should conclude that they don't have any evidence to evaluate the reliability of the website as a source of information.
      2. Emphasize that many of the features you noted while demonstrating vertical reading are not just unhelpful—they can actually be misleading. Students should not draw conclusions about a site based on its URL, appearance, or the presence of specific elements in the contents of the site (ads, lots of information, "Research" tabs, references, etc.)

c. Next, instruct students to work in groups to read laterally about the website, using the guiding questions to help them.

d. After groups have read laterally, ask students: *What did you learn about the person or organization behind this information?*
   i. The Against Malaria Foundation is a well-respected charitable organization based in Great Britain. It provides long-lasting insecticidal nets to people in parts of the world heavily affected by malaria (a disease spread by mosquitos). The Against Malaria Foundation is rated as a highly cost-effective charity by Give Well, an American organization that rates charities, and has been profiled by media outlets including *The Atlantic* and *Vox* (both articles are referenced in Against Malaria's Wikipedia article).

4. Display the social media post
   https://twitter.com/mercola/status/864558623481004033
   a. Demonstrate vertical reading. You may raise the following points about the post:
      i. The tweet includes a specific fact and links to an article. Without investigating these more deeply (e.g., checking whether the linked source is reliable), students might assume that such "evidence" automatically makes the tweet more reliable.

ii. The tweet has 9 retweets and 9 likes. Students may draw different conclusions about these engagement numbers. Many students may assume that this relatively low engagement reduces the reliability of the tweet.
iii. The poster, Dr. Joseph Mercola (@Mercola) describes himself in his Twitter profile as a "physician, health activist and founder of the #1 natural health site, http://www.Mercola.com. I advocate dietary & lifestyle approaches to health." Because he is a doctor and runs what he describes as a very popular health website, students may think the tweet is more reliable.
iv. @Mercola has over 280,000 followers on Twitter, which students may conclude makes him more reliable as a source of information.

b. After you're done, ask students:
    i. *What did we learn about the person or organization behind this information? Do we know anything about their perspective* (e.g., do they have a strong perspective)*? About how authoritative they are* (e.g., whether their background positions them to provide accurate information about malaria and treatments for it)*?*
        1. Students should conclude that you did not learn anything about the source's perspective or authority.
    ii. *If we had to decide right now, how reliable do you think this site is as a source of information?*
        1. Students should conclude that, because they've learned almost nothing about the post's perspective and authority, they don't have anything on which to base a decision about the website's reliability as a source of information.
        2. Emphasize that many of the features you noted while demonstrating vertical reading are not just unhelpful—they can actually be misleading. Students should not draw conclusions about a post based solely on the number of followers, likes, or retweets, the appearance of the tweet, or the poster's description of themselves.
c. Next, instruct students to work in groups to read laterally about the post, using the guiding questions to help them.
d. After groups have read laterally, ask students: *What did you learn about the person or organization behind this information?*
    i. According to Wikipedia, Dr. Joseph Mercola (@Mercola) is "an alternative medicine proponent" who "who markets a variety of controversial dietary supplements and medical devices through his website, Mercola.com." It adds that "Mercola's medical claims have been criticized by business, regulatory, medical, and scientific communities" and "In 2005, 2006, and 2011, the U.S. Food and Drug Administration warned Mercola and his company that they were making illegal claims of their products' ability to detect, prevent, and treat disease." These claims can be verified by sites including *BusinessWeek* the *Chicago Tribune,* and *Chicago* magazine. Despite the fact that the Twitter account or the tweet may *appear* reliable, this is not a reliable source of scientific information.

5. Class discussion. Ask students:
    a. *Who learned more— me from vertical reading or you from lateral reading? What explains that?* Help students understand that reliability isn't a black and white decision, so you can't rely on features like a URL or appearance to tell you definitively that something is or isn't reliable. Instead, we want to learn as much as possible about who is behind the website or post—particularly their perspective and authority—in order to decide how reliable we think they are on the particular topic at hand.

Lateral vs. Vertical Reading Guiding Questions

Source 1: https://www.againstmalaria.com

Vertical Reading:

1. When we read vertically, what features did we use to evaluate the website?

2. What did we learn about the organization behind this information by reading vertically?

Lateral Reading:

3. What organization is behind this information?

Do you know anything about this organization already?

4. What can you learn about the organization by reading laterally?

5. What sources did you use to learn about who is behind this information?

How do you know that these are trustworthy sources?

6. At this point, how reliable is this source of information? Explain.

Source 2: https://twitter.com/mercola/status/864558623481004033

Vertical Reading:

1. When we read vertically, what features did we use to evaluate the post?

2. What did we learn about the person behind this information by reading vertically?

Lateral Reading:

3. What person is behind this information?

Do you know anything about this person already?

4. What can you learn about the author by reading laterally?

5. What sources did you use to learn about who is behind this information?

How do you know that these are good sources?

6. At this point, how reliable is this source of information? Explain.

Reflection:

7. Did we learn more from vertical reading or lateral reading? Explain.

Appendix B

Overview of the Preliminary Piloting Intervention

The intervention was piloted in a West Coast urban school district. Six social studies teachers participated in a one-day professional development workshop led by the research team that introduced Civic Online Reasoning and provided an overview of the intervention's six lessons. Over the course of three months, the teachers taught the six lessons to their students (n = 441). After the second and fourth lessons, teachers met virtually with members of the research team. During these meetings, teachers discussed the lessons they had taught and reviewed the upcoming lessons. Students completed a pretest at the beginning of the intervention and a posttest after. The pretest and posttest were parallel forms of the same assessment. Some students took Form A as a pretest and Form B as a posttest. Other students completed the forms in the opposite order. Counterbalancing reduced the risk that the findings would be affected by differences in the difficulty of the two forms. A hierarchical linear modeling (HLM) regression analysis revealed that students performed significantly better at posttest (see below). At the same time, student responses to posttest items, along with discussions with participating teachers, highlighted ways to improve the intervention. Topping the list was the imperative to teach fewer strategies more robustly. We revised the lesson plans included in the intervention to devote more curricular time to teaching the key strategy of lateral reading. As a result, students would have more opportunities to learn how to evaluate the credibility of online sources.

Materials & Intervention

Six social studies teachers taught six 1-hour-long digital literacy lessons to students in their courses. The lesson plans were first drafts of the lessons featured in the main intervention reported in this paper.

Participating teachers also received professional development to support the implementation of the lessons. Two members of our team provided teachers with a 1-day workshop that introduced our approach to digital literacy and provided an overview of the curriculum materials. These two team members also met with participating teachers as they implemented the lessons to provide guidance and support.

Participants & Setting

Participants included 441 students at an urban public high school on the West Coast of the United States. The school enrolls over 15,000 students from 7th to 12th grade. Over a quarter of the district's students were classified as English Learners, and another 48% were "Fluent English Proficient" (English was not their primary language but they had achieved English fluency). Nearly three quarters of the students were Latino, and 70% were eligible for free or reduced-price lunch.

Outcome Measures

Students completed a pretest and a posttest. We used two parallel forms (Form A and Form B). Each form had five tasks, and the questions posed for each task were identical on both forms. However, the online content students evaluated for each question was different on each form. 239 students took Form A at pretest and Form B at posttest; 202 took the forms in the opposite

order. Mixing the order of the forms ensured that differences in pre/post scores were attributable to student learning, not to differences in the difficulty of the forms.

Analysis

We examined whether students were more likely to score higher at posttest than they did at pretest. To account for data nesting, we used a multilevel linear mixed regression model (cf. Theobald, 2018). *Students* (n = 441) were nested in *teachers* (n = 6) at one school. *Order* of test administration (A→B or B→A) and *time* (pre to post) were treated as fixed effects, and *students nested in teachers* and *observations nested in students* were random effects. Because teachers may have differed in how they delivered the curriculum, the intercepts and slopes for the teacher effect were assumed to vary across teachers.

A QQ-plot of the residuals from the predicted values revealed outliers at the tails of the distribution. To address the effects of outliers on the estimates of standard error of the parameters, we used the R package *robustlmm* (Koller, 2016) to calculate robust parameter estimates.

Results

Table B1 reports the robust parameter estimates and standard errors from our analysis. Controlling for the *order* in which the forms were administered and the *order by time interaction*, the estimate for *time* (bolded) was statistically significant. This suggests that students scored significantly higher after the intervention than before, controlling for the order that they took the forms.

The *order by time interaction* was statistically significant, indicating that the order of administration of the two forms mattered. However, the difference in pretest and posttest scores were statistically significant for both orderings (A→B and B→A), which suggests the gains students made from pretest to posttest are not explainable by differences in difficulty in the forms.

Table B1. *Robust Fixed Effects Unstandardized Linear Mixed Model Parameter Estimates*

	Estimate	Std. Error
(Intercept)	-1.14*	0.49
Order (A→B or B→A)	0.75*	0.37
Time (pre to post)	**1.71***	**0.36**
Order by time interaction	-0.60*	0.16

*Estimate is significant at $p < .05$ or lower.

Appendix C

Overview of Pretest and Posttest Tasks

The pretest and posttest measured a range of online evaluation skills. Each of the items in the protocol was piloted in classrooms across the United States as part of an ongoing research and development project (Breakstone et al., 2018; McGrew et al., 2017). We also conducted think-aloud interviews to ensure that item types tapped the intended digital literacy constructs (cf. McGrew et al., 2018).

The pretest and posttest were designed as parallel measures. Each item on the posttest posed the same question as the pretest, but the stimulus materials were different at posttest to minimize testing effects attributable to prior exposure.

Task Description	Pretest Stimulus	Posttest Stimulus	Knowledge/Skills Assessed
Task 1 Explain why an online article whose author has a conflict of interest may not be a trustworthy source.	Article on how tech can help small businesses written by the CEO of eBay	Article on Millennials' spending habits "presented by the Bank of America"	• Decide where to invest attention • Identify sponsored content and detect conflict of interest
Task 2 Determine the reliability of a photo posted to social media by an anonymous source	A tweet from an unknown person with a photo that purports to depict the effects of the Syrian civil war	An Imgur post from an unknown user with a photo that purports to show the effects of the Fukushima nuclear disaster on plants and flowers	• Decide where to invest attention • Recognize when there is insufficient information to make a judgment of credibility
Task 3 Evaluate the reliability of a website funded by companies who have incentives to mislead	Website of an organization sponsored by fossil fuel companies presenting content about climate change	Website of an organization sponsored by fossil fuel companies presenting content about climate change	• Lateral reading • Identify cloaked websites that hide sponsorship or backing • Detect conflict of interest
Task 4 Compare the trustworthiness of data, one from a reliable source and	Two data displays on student debt: a chart from the National Center for Education	Two data displays on minimum wage: a chart from the U.S. Department of	• Decide where to invest attention • Appearance is deceptive and not a

the other from a questionable source	Statistics and an infographic lacking attribution	Labor and an infographic lacking attribution	marker of trustworthiness
<u>Task 5</u> Determine which website is more trustworthy: a well-sourced Wikipedia entry or a webpage with a dot-edu domain	Two pages on animal testing: a Wikipedia entry and a page featuring a student essay from Lone Star College	Two pages on gun control: a Wikipedia entry and an individual's Duke University webpage featuring a National Rifle Association broadside	• Deft use of Wikipedia • Top-level domains are not markers of trustworthiness
<u>Task 6</u> Evaluate the reliability of information posted without attribution by an unknown user in the comment section of a news website	A comment on the death penalty from a user named "Turnstile78"	A comment on school start times from a user named "ThoughtGus2"	• Decide where to invest attention • Evidence needs to come from a reliable source to be credible
<u>Task 7</u> Students decide if a Wikipedia page is a reliable source	A locked Wikipedia page on the Statue of Liberty; it has "featured" status	A locked Wikipedia page on George Washington; it has "good article" status	• Markers of credibility on Wikipedia, including protected or locked pages

Appendix D

Weighted Kappa, Asymptotic Standard Error, and Significance for Pretest and Posttest Tasks

	Pretest		Posttest	
Task	κ	*se*	κ	*se*
T1	.99*	<.01	.98*	<.01
T2	.98*	<.01	.98*	<.01
T3	.94*	.02	.96*	.01
T4	.91*	.02	.95*	.01
T5	.91*	.04	.92*	.02
T6	.97*	<.01	.98*	<.01
T7	.93*	.02	.98*	<.01

*$p < .001$