Fact Checking in an Era of Fake News

Grade Levels: Grades 6-12

Duration: 50-60 minutes

Next Generation Science Standards
Disciplinary Core Ideas: Varies depending on what content the lesson is applied to.

Science and Engineering Practices: Obtaining, Evaluating, and Communicating Information.

Crosscutting Concepts: Patterns

Content Area: Digital Literacy

Learning Objectives/Outcomes

- After an introduction to "fake news", students will be able to explain the importance of validating social media posts in a class discussion.
- By working in small groups, students will be able to assess their lateral reading skills and identify their strengths and weaknesses.
- At the conclusion of this lesson students will be able to demonstrate the process of lateral reading by completing three case studies.

DESCRIPTION

The ability to check the credibility of digital sources and the truth of their claims about socio-scientific issues is a critical skill students need to develop. However, it is becoming more difficult to discern fake news from truth and approaches commonly used in science classrooms, such as checklists, have several drawbacks. This lesson uses the approach of lateral reading to teach students fact-checking skills that students can use whenever they source information from digital sources.

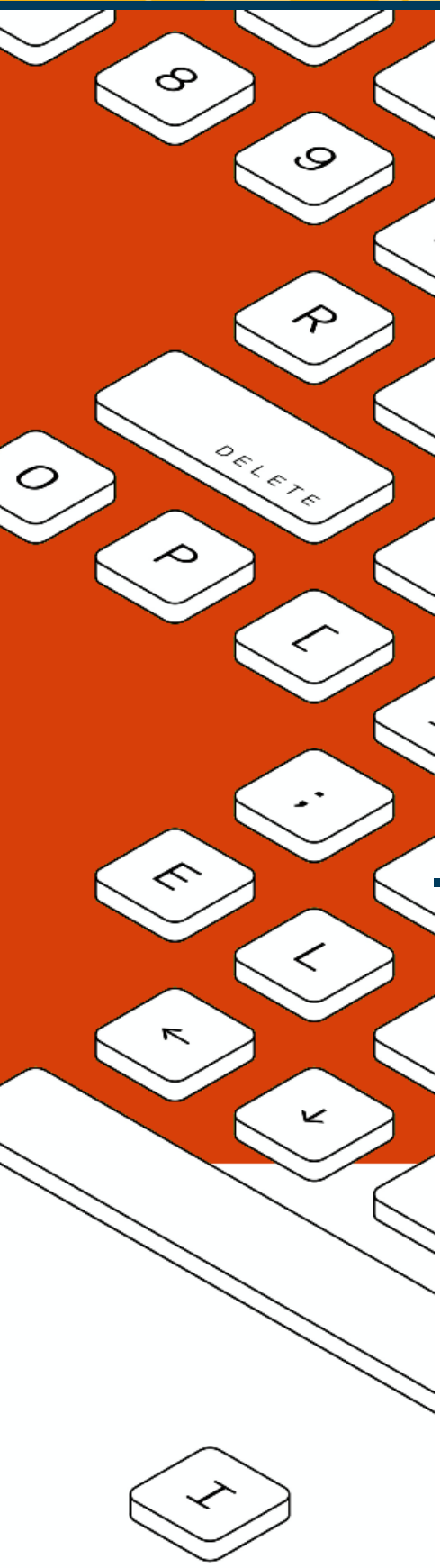
In this lesson, students will engage in dialogue about fake news and learn the basics of lateral reading, which involves triangulating claims in an on-line post by exploring outside of the post. Students then, as a group, work through selected examples like, in this case, genetic engineering applications in agriculture. Subsequently, they work in small groups on their own to fact check different social media posts. The lesson includes rubrics that students or teachers can use to assess students' lateral reading skills.

INTRODUCTION

1. Start the lesson with: "What does the term 'fake news' mean to you?". Remind students to think about where fake news comes from, its purpose, and the role it plays in society. Have students Think-Pair-Share.
2. Build on this discussion by showing one or both of the following videos. These short videos will orient students to how the process of developing news has changed over time and how advances in technology have made it easier for anyone to develop "news" or "user created content". They also discuss how fake news proliferates through our social media networks.
    a. How False News Can Spread – Noah Tavlin
    b. How to Choose Your News – Damon Brown

LATERAL READING

1. Choose an assessment from the genetically engineered (GE) agriculture-related case study we provided - links are in the materials section of this lesson. This case study will be used to demonstrate the process of lateral reading.
2. Introduce the three central questions of lateral reading: Who is behind the information? What is the evidence? What do other sources say? These are the three questions students should look to answer when validating a source of information. To do this, students will utilize different internet searches outside of the source being validated and use those as evidence to determine if the source is trustworthy or not. For more information on the basics of lateral reading and introductory lessons, visit Civic Online Reasoning.



3. As a class, review the GE agriculture case study. Have the students work in pairs to use the lateral reading questions to begin to validate the case study. If students have access to the internet, they can perform searches and gather evidence to share. If they do not, they can determine what searches they would perform.
4. Pairs share out their evidence and reasoning to the class. On the board record the reasoning into one of three categories associated with lateral reading: Who is behind the information? What is the evidence? What do other sources say? After this is completed, the class will vote on whether or not the source is trustworthy.
5. At this point share the case study's associated rubric with the students. Answer any questions students might have about using the rubric to assess their lateral reading skill. It is important to point out at this time that there are numerous ways that a single information source can be validated.
6. Have students get into small groups of 2-4. In these groups, students will complete the rest of the GE agriculture case studies. It is preferable that students are able to use an internet-connected device to get the most out of the case studies. To complete a case study, the group must write a short synopsis of their reasoning why the source is trustworthy or not. Once completed, the teacher will provide them the associated rubric so the groups can self-assess their lateral reading skills.
7. If time allows, provide an opportunity for each group to report out on what they learned as they completed the case studies. The discussion should be focused on lateral reading skill development and not about the specifics of the case studies themselves.

DEBRIEF

Have students answer the following questions individually. This could be done as an exit ticket, in a class notebook, or provided as homework.

- Who is responsible for fact checking information: the producer or the consumer?
- What are the consequences if you do not fact check the information you receive?
- What does the term "fake news" mean to you?
- What types of evidences persuade you to believe someone?

Case Studies

YouTube:

- Case Study #1: Genetic engineering: The world's greatest scam?
  Notes about this case study:
  - The video was published in 2009, meaning that all of the statistics referenced within it need to be confirmed.
  - "Plants are cultivated outdoors where they cannot be controlled". That statement isn't specific to GE plants; all plants that are grown outside can be difficult to control.
  - Imagery is really targeted, using a symbol similar to the nuclear waste graphic to show which plants are genetically modified. It also depicts the farm that these products would be used on as an industrial complex with smokestacks.

Materials Overview:

- 2 YouTube case studies ("Genetic engineering: the world's greatest scam?" and "GMOs 101 with Jeffrey Smith")
- 2 Twitter case studies ("Golden Rice Nutritional Benefits" and "Feeding the World")
- 1 Facebook case study ("GMO Free USA")
- Civic Online Reasoning Case Study Examples

Case Studies (continued)

- The video combats the argument that GE crops produce higher yields by saying "this marketing mantra is a complete hoax" without providing any evidence as to why that claim might not be true.
- The video claims that there are only two reasons why genetically modified plants are created: herbicide tolerance or insect resistance. There are multiple other reasons why GE products are being developed, with disease resistance being one major reason.
- GM crops with an insect resistance do not "give off poisonous gases".
- Video producers tie the GM issue into the issue of de-forestation in South and Central America without citing any sources on whether farms in deforested areas actually grow GM crops.
- Video claims that the soil and water table under a GM crop field is poisoned without citing any sources about whether that is true.

- Case Study #2: GMOs 101 with Jeffrey Smith
  Notes about this case study:
  - Jeffrey Smith, the speaker in the video, is a self-published author, film producer, and well-known anti-GMO activist. He founded the Institute for Responsible Technology.
  - The language and imagery target your emotions: "take DNA…and force it into other species" while animals are making sounds of distress in the background of the video.
  - His definition for genetic modification doesn't address the fact that some GM products use genes from the same or related species to make the modification, as opposed to completely unrelated species.
  - Video was published in 2013 and currently there are 12+ major crop species that have been genetically modified.
  - He talks about the process in very simplified terms: "the crops absorb these weed killers, which are poisonous, and we eat them…we will talk about what can go wrong when we eat a weed killer." His language is targeted to your emotions (e.g. "poisonous", "weed killer").
  - He described *Bacilus thuringiensis* (Bt) as "basically a poison – it's an insecticide that breaks open the stomach of insects to kill them", which further highlights strong, value- and emotion-based language.
  - The Bt corn/insect imagery infers that the insect immediately dies upon ingesting the corn. Depending on the amount of Bt the insect has consumed, the insect will die within "a few hours or weeks" (source: National Pesticide Information Center)
  - Plants modified to include the Bt gene are not "registered pesticides" as the speaker claims.
  - He does address that there are other plants that have been genetically modified to fight diseases but spends less than 5 seconds in a 6+ minute video discussing that side of genetic modification.
  - He relies on correlated data to imply that GMO products are the cause of an increase in health effects (cancer, heart disease, Alzheimer's, autism, Parkinson's, obesity).
  - He references a "GMO Summit" throughout the video, where he will dive into more information about each of the points he makes in the video, making it feel like the video was produced with the purpose of enhancing interest/selling tickets to that event, especially the "empowerment package you can invest in".

Twitter:

- Example #1: Golden Rice Nutritional Benefits (twitter.com/michaelpollan/status/1003677004825124866)
  Notes about this case study:
  - The tweet is from best-selling author Michael Pollan. This fact alone could influence students to see the associated link as trustworthy.

Case Studies (continued)

- The tweet is vague and requires clicking on the link to understand.
- Title of article "GMO Golden Rice Offers No Nutritional Benefits Says FDA" is a misrepresentation of the FDA's findings. The FDA states that golden rice would provide 5% of B-carotene in a US diet. However, in countries where golden rice would be consumed, rice consumption is 10X higher, thus providing a nutritionally significant amount of B-carotene.
- The linked article is from "Independent Science News", which appears to be scientific in nature, is a site founded by Jonathan Latham and Allison Wilson, authors of the linked paper. This is not stated in the article and is a conflict of interest.
- Web-searching the website sources of information (Independent Science News, or the authors) reveals that the site and authors are anti-GE.
- Media Bias/Fact Check, an online database of media bias, classifies the site as a source of "moderate pseudoscience" and debunks the linked article.

- Example #2: Feeding the World (twitter.com/IRTnoGMOs/status/1332015026098614278)

. Notes about this case study:

- The claim is made by the Institute for Responsible Technology, a site that Media Bias/Fact check states "is a strong Pseudoscience website that promotes anti-GMO propaganda."
- The article linked to from the source tweet and the cited paper are all written by the same person, Jonathan Latham, and published by an organization founded by Latham - an example of circular reporting.
- The article linked to from the source tweet is on the website gmwatch.org, a website that promotes anti-GE agriculture. Media Bias/Fact check states gmwatch.org is a "moderate conspiracy website and quackery level pseudoscience source."

Facebook:

- Example from GMO Free USA's Facebook page, which links to this study and this GM Watch article.

Notes about this assessment:

- Scientific article was published in Food and Nutrition Science, an international peer-reviewed journal dedicated to the latest advancement in food and nutrition sciences.
- GMO Free USA's mission "is to harness independent science and agroecological concepts to advocate for clean and healthy food and ecological systems. We will educate consumers and other stakeholders about the potential hazards of genetically engineered organisms, synthetic pesticides, and advance the Precautionary Principle", meaning that they have an inherent bias to publicize information that furthers their mission. They also organize and support national boycotts of food companies that use GMO ingredients.
- The language they include in the caption is copied verbatim from the abstract and conclusion of the study – there isn't any spin or new interpretation of the findings. The study is also recent (published in 2018).

Civic Online Reasoning Case Study Examples:

- Claims on YouTube
- Evaluating Wikipedia
- Claims on Twitter
- Website Reliability

Claims on Twitter Rubric

Here we ask students whether or not a claim made by the Institute for Responsible Technology (@IRTnoGMOs) on Twitter is trustworthy. The tweet claims that "The idea that the world might soon be unable to feed its human population is an old and powerful narrative that has recently been extensively exploited by agribusiness." The tweet links to an article published on the website gmwatch.org: "The myth of a food crisis—new paper". Based on the title of the article alone, some students might accept this article as evidence for the tweet. However, upon investigation it can be determined the tweet is an example of circular reporting. Strong responses will discount the claim based on this reasoning.

Mastery

Student argues that the claim cannot be trusted and fully explains that the article linked on the site gmwatch.org "The Myth of a Food Crisis—new paper" is written by Jonathan Latham. That article cites a similarly titled paper, "The Myth of a Food Crisis" from a non-peer reviewed journal by Jonathan Latham. "Thy Myth of a Food Crisis" is published by The Bioscience Resource Project (BRP). The BRP is owned and operated by Jonathan Latham and publishes on genetic engineering and its risks. In addition, the website gmwatch.org was founded to promote anti-genetic engineering.

Emerging

Student argues that the claim cannot be trusted and explains that the Institute for Responsible Technology (@IRTnoGMOs) has a strong anti-genetic engineering stance. Student may mention that Jeffery Smith, founder of IRT, is strongly anti- genetic engineering.
Does not mention any issues with the link to the gmwatch.org article.

Beginning

Student argues that the claim can be trusted or argues that it cannot be trusted but does not identify the conflict of interest outlined above.

Claims on Twitter Rubric

Here we ask students whether or not a claim made by bestselling author Michael Pollan (@michaelpollan) on Twitter is trustworthy. The tweet has little detail but links to an article from Independent Science News entitled "GMO Golden Rice Offers No Nutritional Benefits Says FDA." The article claims "the US Food and Drug Administration (FDA) has concluded its consultation process on Golden Rice by informing current developers, the International Rice Research Institute (IRRI), that Golden Rice does not meet the nutritional requirements to make a health claim." Based on the well-known source of the tweet, the title of the article, and the appearance of being well-cited, some students see ample evidence to label the tweet as trustworthy. However, upon investigation it can be determined that the article's claim is misrepresenting the findings by the FDA. Strong responses will discount the claim based on this reasoning.

Mastery

Student argues that the claim cannot be trusted and fully explains that the linked article source is Independent Science News. This site was founded by Jonathan Latham and Allison Wilson, who are also the article authors. Independent Science News does not support genetic engineering. Student reasoning should also include the misrepresentation of the FDA's findings: The FDA states that golden rice would provide 5% of B-carotene in a US diet. However, in countries wheregolden rice would be consumed, rice consumption is 10X higher, thus providing a nutritionally significant amount of B-carotene. Evidence could come from a variety of sources including the FDA report, replies to linked article, replies in the source tweet, and other articles that can be found by searching key words such as golden rice, nutritional benefits, B-carotene.

Emerging

Student argues that the claim cannot be trusted and explains that the Independent Science News has an anti-genetic engineering stance. Students do not mention the misrepresentation of the FDA's findings.

Beginning

Student argues that the article's claim can be trusted because of the title of the article, that the source of the tweet is a famous author, that the article seems well cited, or similar. Student argues that the article's claim cannot be trusted but does not identify the evidence outlined above.

Claims On Facebook Rubric

This task asks students to assess the validity of a post from @GMOFreeUSAs Facebook page, which includes an infographic and an article interpreting the results of a scientific study. The study, "Histopathological Investigation of the Stomach of Rats Fed a 60% Genetically Modified Corn Diet", concludes that the GMO corn diet affected the junctions within the rat's stomach mucosa, which may have health implications. Although GMO Free USA has an inherent bias to publish and share news sources with an anti-GMO slant, they provide detailed information and direct quotes from the scientific paper in their post. Strong responses will accept the validity of the information included in the post based on this reasoning but will identify the jump in logic to boycott GMO products based on these results. Their claim to boycott GMOs and applying the results to a human context appeals to value-based and emotion-based forms of reasoning to illicit a response in their readers.

Mastery	Student argues that the information included in @GMOFreeUSAs post is accurate, but their claim to boycott GMO products based on the results of the study is a jump in logic that appeals to their readers value-based and emotion-based reasoning.
Emerging	Student argues that the information included in @GMOFreeUSAs post is accurate by identifying that the language included in the infographic and post is copied directly from the abstract and conclusion portions of the scientific study.
Beginning	Student argues does not identify the pieces of information outlined above.

Claims on YouTube Rubric #1

This task asks students to assess the validity of a YouTube video ("Genetic engineering: The world's greatest scam"), which contains multiple claims related to the risks associated with GMOS. The video was posted by @GreenpeaceVideo, the official YouTube account for Greenpeace International – an "independent campaigning organization that uses peaceful protest and creative communication to expose global environmental problems". The account has 160,000+ followers. The producers of this video do not include any source information for many of these claims, either in the video notes or within the script of the video itself. Additionally, the video distinguishes GMO-related imagery with negative graphics, including symbols similar to the nuclear waste graphic. Lastly, given that the video was originally posted in 2009, all of the statistics need to be verified before using. Students are asked whether this video is a reliable source of information about GMO risks. Strong answers will identify that the video is not a reliable source of information given the lack of credible evidence to support the claims within the video and the inherent bias associated with its producers and the purpose of the video.

Mastery

Student clearly articulates a sound reason and complete explanation about why the video is not a reliable source of information. Reasons include:

- @GreenpeaceVideo doesn't provide any credible evidence to support their claims
- Greenpeace International has an inherent bias in producing this video – to dissuade individuals from using or supporting GM technologies or GMO products

Emerging

Student does not effectively evaluate the source of the video, but does fully explain another significant problem of the video, including:

- Although the video uses statistics, it does not provide information about the sources of those statistics
- Negative imagery and graphics associated with GM technologies and GMO products

Beginning

Student does not identify any relevant aspects of the video that affect its credibility.

Claims on YouTube Rubric #2

This task asks students to assess the validity of a YouTube video ("GMOs 101 with Jeffrey Smith"), which contains multiple claims related to the risks associated with GMOS. The video was posted by @FoodRevolutionNetwork to promote a GMO Summit. Jeffrey Smith, the speaker in the video, is a self-published author, film producer, and well-known anti-GMO activist. The speaker makes uses strong language and imagery that targets the viewer's emotions (e.g. "forcing DNA into other species", background sounds of animals in distress, "poisonous", "weed killer"). Additionally, he oversimplifies processes and reasons, affecting the validity of those claims. For example, he claims that plants that have been genetically modified to include Bacilus thuringiensis resistance are "registered pesticides", which is not true. Lastly, the purpose of the video is to promote an event and encourage individuals to purchase a product package. Students are asked whether this video is a reliable source of information about GMO risks. Strong answers will identify that the video is not a reliable source of information given the inherent bias associated with the purpose of the video, lack of supporting evidence, and negative language and images.

Mastery

Student clearly articulates a sound reason and complete explanation about why the video is not a reliable source of information. Reasons include:

- Jeffrey Smith and the producer (@FooRevolutionNetwork) have an inherent bias in producing this video – to promote participation in the GMO Summit and sell packages
- Negative images, language, and background sounds targeted at eliciting an emotional response from viewers
- Jeffrey Smith includes non-factual or misrepresented information in his claims

Emerging

Student does not effectively evaluate the source of the video, but does fully explain another significant problem of the video, including:

- Although the video uses statistics, it does not provide information about the sources of those statistics
- The video was published in 2013 and therefore includes outdated information

Beginning

Student does not identify any relevant aspects of the video that affect its credibility.