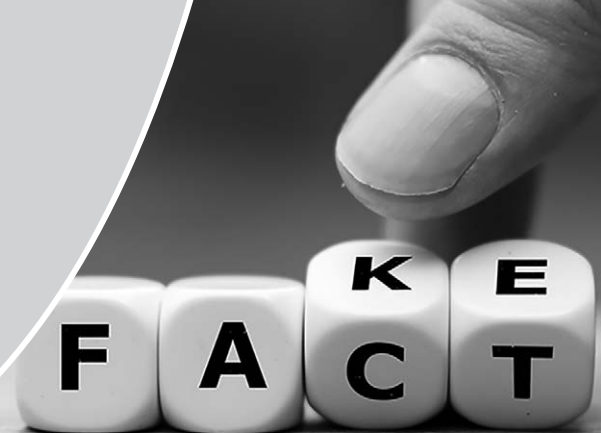


Sorting Fact from Fiction:
Media Literacy in the Biology
Classroom

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**ABSTRACT**

The purpose of the proposed lesson is to help students develop media literacy skills, which are necessary across the curriculum and in students' everyday lives. Students will do so by evaluating a provided conspiracy theory and, later, a pseudoscience claim (alternatively, students may supply either material). In order to thoroughly evaluate the claim, students will generate and answer media literacy questions, with instructor or peer support as needed. Once students have practiced using the media literacy questions to evaluate the conspiracy theory, they will progress to more challenging material, such as a pseudoscience claim about a fad diet. Finally, the instructor may choose to extend the lesson to allow students time to apply their media literacy skills to a curricular pseudoscience claim, perhaps regarding climate change or the efficacy of vaccines. To complete the lesson, students will reflect on the content of the claims, why the misinformation matters, and the process of evaluating the material to draw appropriate conclusions.

Key Words: media literacy; pseudoscience; inquiry; nature of science; climate change.

○ Introduction

Students in my introductory Honors Biology and Advanced Placement Biology courses are frequently asked to support a conclusion with evidence from class materials. Overwhelmingly, I find that students have little problem sorting through the evidence provided to find the correct piece to justify their claim. However, trouble arises in a *nonacademic* setting. When students are confronted with information that they must evaluate in order to make a decision, increasingly I see students unable to sort out fact from fiction. They naively equate celebrity endorsement with a double-blind randomized clinical trial. In the same way, they confuse an official-looking website with an actually official website. Outlandish claims are made in hopes of an article receiving more retweets or likes or a product selling more units. It is now more imperative than ever that teachers, and particularly science teachers, give students the skills they need to sort fact from fiction and analyze

a data set so that they can be empowered to make appropriate decisions.

With the time students spend engaged with social media soaring, it is critical that students exit secondary institutions with more than just the three Rs. To function at higher levels of learning and in society at large, students must now process a constant deluge of information from sources as varied as traditional news media, their families and friends, celebrities, and ever-present advertisements, not to mention the snaps and tweets and posts that constantly demand their attention. As students process this flood of information, they are confronted with two challenges: filtering the content so that they are left with only relevant information and sorting out relevant misinformation. Although addressing this problem seems far too much for one educator to take on, we must begin to do so, or an entire generation of students will leave our classrooms with, at best, a collection of facts, a few reasoning skills, and an assortment of fond memories – but with no tools to harness the incredible power of the knowledge just behind their touch screens or to make a decision based on sound information.

Engaging students in conversations about, and exercises designed to build, media literacy skills is more important than ever. The need for these skills has been recognized in Practice 8 of the *Next Generation Science Standards*, “Obtaining, Evaluating, and Communicating Information,” which aims for students to

- gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source; and
- evaluate the validity and reliability of (and/or synthesize) multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible.

Through completion of this lesson, students will

- engage in critical reading of pseudoscientific and scientific documents and data; and
- demonstrate thorough evaluation of sources of information.

Although these skills cannot be tidily achieved in a single class period, below I offer one strategy for beginning to do so.

○ Inquiry Activities in the Classroom

My overall strategy is to prime the discussion with some obvious examples of conspiracy theories the students readily recognize as bogus and/or ridiculous. Students use these cases to develop a list of questions that will help someone identify the claims as misinformed. After they have compiled a joint list (with some guidance), I invite them to apply their probes to some more challenging examples, where the answer is not so obvious. Later, we apply these self-styled tools to more significant cases, such as claims about anthropogenic climate change and vaccine safety.

First, to simulate this position in the classroom, I present students with various conspiracy theories that most immediately see as ridiculous (if it suits your classroom purpose, you may choose to use only biological examples):

- The moon landing was faked
- The Loch Ness monster exists
- Aliens have invaded Earth
- The Earth is flat
- The geocentric model of the solar system is correct
- Various images from the Mars rover show a squirrel on the red planet

I also invite students to submit advertisements or claims they have seen on their social media feed that they are fairly sure are bogus. Students may need a day or so to do some “research” on this, but typically at least one student in the class can provide a claim that (s)he has been wondering about off the top of his or her head, such as

- celebrity endorsements of any product (but I encourage students to find claims that a biologist could evaluate),
- the benefits of juice cleanses,
- the benefits of a woman consuming her placenta, or
- the benefits of various fad diets

Allowing students to find their own examples is an easy but powerful way to ensure student buy-in and motivation.

Then I ask students to approach these claims objectively. No matter the material, I ask students to generate a list of questions to help them evaluate the material in pairs or small groups. If you find that students have trouble being objective about a claim they have brought to class, you may elect to have them switch with another student or group. To provide a framework for the task, I encourage them to focus their questions within a few categories centered around the core principles of the National Association for Media

Table 1. Media literacy question categories
(adapted from the more detailed chart available at <https://drive.google.com/file/d/0B8j2T8jHrIgCZ2Zta2hvWkF0dG8/view>).

Media Literacy Question Categories	
Authorship & Audience	Author
	Purposes
	Economics
	Effects
	Responses
Message & Meaning	Content
	Techniques
	Interpretation
Representations & Reality	Context
	Credibility

Literacy Education (see Table 1), which provide an existing framework for this discussion and are easily adaptable for the biology classroom.

Previous articles published in *The American Biology Teacher*, such as Douglas Allchin’s “Credibility Games” in this issue, provide authentic, inquiry-based activities to help biology teachers engage their students in conversations regarding how one ascertains who is an “expert” and therefore to be trusted, and allow students to examine how they decide to bestow this designation on someone. These “games” may serve as a nonthreatening introduction to media literacy for instructor and student alike. Some questions my students have generated beyond the realm of expertise are listed below:

- “Who does this message benefit?”
- “Who will make money off of this claim?”
- “Do other people/groups/scientists make the same claim?”
- “Does the language in the ad/claim indicate bias or is it professional?”

After being given a few minutes to compose their questions, I ask students to share their list to discuss what in their previous experience or the material in front of them prompted them to write these questions. Doing so allows students to make an explicit connection between the activity at hand and their life experience and also provides them with a future context in which they could use the skills they are building. As students share, I compile a list on the board and ask students to edit their lists as necessary. If needed, I offer suggestions as required to make a comprehensive list. My student population is fairly homogeneous, and questions in the area of interpretation and effects – that is, exploring how various audiences may interpret the material differently and how the

claim may affect various groups – are not always readily apparent to them.

Next, I ask students to use our collaborative list of questions to evaluate the claim that I have provided and/or that they have brought to class. This often requires outside research, and I provide support as necessary, but students are fairly resourceful in finding information when motivated to do so by a mystery or claim in which they are interested and invested. As students begin their research, I remind them to apply the same list of questions to any source that they will potentially use to evaluate the initial claim or ad. I ask students to keep a log of sources used to evaluate the claim that they are investigating, with information on each source and what piece of information they gained from that source. This might be accomplished in class if the class period is longer, but I typically help students get started and then assign the rest as homework because our class periods are 50 minutes.

The next day, I ask students to share their findings. Class discussion helps fill in any gaps in students' evaluation of the claim. The final step is for students to reflect on their process and findings, and I have found that a few open-ended questions work well for guiding their thinking. This reflection could be submitted as an assessment or treated as a more informal wrap-up, depending on the instructor's goals.

○ Conclusion/Extension

In my classroom, we return to these lists in subsequent units throughout the year and have applied them to materials denying the reality of climate change. For example, I have given my students pseudoscience materials from the Heartland Institute, which claims that climate change is not anthropogenic, and asked them to answer as many of the media literacy questions that we formulated as possible in a class period or as homework before a lesson on global climate change. One could also employ these questions to evaluate antivaccine materials in the context of an immunity unit. Additionally, an instructor could help students investigate the conspiracy theories surrounding the COVID-19 pandemic (most notably, that COVID-19 was mistakenly released from a lab in China or that 5G wireless networks are somehow linked to the spread of the virus). If these extensions are used, the relevant learning objectives expand to include content-specific goals.

I am certain that with the collective wisdom of my colleagues, there are myriad ways to weave these skills into the curriculum, and I look forward to hearing how others have done so in their classroom.

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