**Evaluating Credibility of Claims Using Bellringers**

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November 2023

Sooner or later, everyone wants and needs to find trustworthy scientific information related to science and technology, on topics such as vaccines, emerging diseases like COVID and RSV, green energy, pharmaceuticals, dieting, nutrition, mental health, hobbies (like gardening), environmental issues, artificial intelligence, and more. Many students, and even adults, are not proficient at evaluating information found online, so in science class we should teach students how to search for trustworthy information. (Note that some students even think that every source presented in a Google search must be accurate!)

Short activities can help a lot, encouraging students to develop the habit of checking dubious claims. In the process, with teachers’ guidance and feedback, students will learn how to evaluate what is trustworthy information. They can learn that many surprising scientific claims turn out to be true (there really is water on the moon) while other claims do not. It is important that teachers present students with some claims that turn out to be accurate and others that are not. After all, students should not be skeptical about every scientific claim they find in the media, or elsewhere. Note that teachers do not need to focus on controversial issues, especially if they are only beginning to ask students to evaluate claims allegedly based on science.

A ‘bellringer’ is a short activity used at the beginning or end of class. It takes little time for students to investigate a claim provided by the teacher. Ask students to reach a conclusion: Is this claim true, i.e., based on credible scientific evidence, and how do they know? It’s best if students can search online for themselves during class. If that’s not feasible, the teacher can project a computer display and conduct an online search for all to see, asking students in the class what to do to investigate the claim.

Choose a claim that is interesting to students, or that is related to what the class is studying, or that is a way of following up what some student has suggested is true (and you are not so sure it is). Perhaps you can display an actual news article or social media post and ask students whether that claim is based on credible science or not.

The list on page 3 provides some suggestions. Some of the claims on the list are true, while others are not. What questions can students ask to find out if a claim is true? The key question to ask is whether the **source** of the claim, or the counter claim, is trustworthy because few people are qualified to evaluate evidence on complex topics for themselves. We rely on expert scientists to do the research and analysis, and on the scientific enterprise to weed out errors through multiple steps: evaluating research proposals, peer review of publications, conferences where findings are discussed, syntheses and reviews that look at multiple studies, and reports prepared by groups of experts under the auspices of scientific and professional organizations and agencies such as the Centers for Disease Control and Prevention, U.S. Food and Drug Administration, Environmental Protection Agency, Intergovernmental Panel on Climate Change and others.

A useful heuristic for teachers and students is S.I.F.T.

**S means Stop and think, what is this claim saying and why was it made?**

**I means Investigate the source and consider whether it’s trustworthy.**

**F means Find other coverage to determine what other ources say.**

**T means Trace the claim, quote, or reference in media to the original source.**

This is not meant to be a rigid set of steps that one always follows. Instead, these are four useful points to keep in mind. The big idea is that students—and teachers—become more proficient as they practice.

See list of claims on the next page

**Is this claim true? How do you know?**

Note: Teachers should investigate a claim themselves before asking students to do so!

1. Antiperspirants that include aluminum cause cancer
2. Certain jellyfish are immortal; they can live forever
3. Next year, for the first time in 666 years Halloween will fall on Friday the 13th
4. Vaping and e-cigarettes are safer than smoking and pose little risk to young people’s health
5. Once every century there is a “green moon” visible throughout the world
6. Although sunsets are typically red and orange, sometimes people see a bright green flash at sunset
7. Using the correct antibiotic will cure COVID-19
8. Lightning is sometimes visible in the form of a small, slowly moving sphere, called ball lightning
9. Large doses of Vitamin C will prevent or cure the common cold
10. Consuming some fat in your food is good for you
11. Just about everybody benefits by taking a daily vitamin supplement
12. The largest animals living in the sea are whale sharks
13. Water has been found on the moon and might be used by astronauts to make rocket fuel
14. Human DNA can last for a thousand years
15. Fresh fruits and vegetables are always healthier than canned, frozen, or dried varieties

Students can be a good source of dubious claims, allegedly based on science, that deserve investigating.

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