



HOW IS INFORMATION CONSTRUCTED?



6

FACT SHEET

QUESTIONS TO ASK YOURSELF ABOUT SCIENCE NEWS

OBJECTIVES OF THE CURRICULUM

DISCIPLINES AND LEVELS CONCERNED

English (Elementary Cycle 3)

Reading varied texts:

- Using literary and common texts to develop critical and creative thinking;
- Identifying some characteristics of texts and seek to convince or call to action.

Science and Technology (Elementary Cycle 3)

- Propose explanations or solutions to scientific or technological problems

TARGETED DIMENSIONS OF THE DIGITAL COMPETENCY

- Exploit the potential of digital technology for learning;
- Develop critical thinking regarding digital information;
- Produce content with digital technology;
- Innovate and show creativity with digital technology;
- Communicate by using digital technology.

SUGGESTED DIGITAL TOOLS

- Create a concept map: Popplet;
- Produce an infographic: Canva;
- Record a podcast: Anchor.

EDUCATIONAL INTENTION OF THE GUIDE

By the end of these activities, the students will have the necessary tools to assess the credibility of scientific information.

OBJECTIVES OF THE ACTIVITIES

- Using a concept map, distinguish reliable information from doubtful information, taken from an article on science;
- By creating an infographic, make a critical judgment concerning the reliability of different information;
- In a podcast, discuss our digital identity and different behaviours we may have regarding what is seen and heard on the Web.

BEFORE BEGINNING: DISCUSSION/DEBATE

- **Objective of this discussion (for the teacher):** Help students understand that the following claims, which seem to be science-based, don't all have equal value, even if they seem to use a scientific vocabulary.

Note to the teacher: it could be useful if the following situational exercise comes after a discussion or an assignment during which students are encouraged to think about the difference between fact and opinion. As needed, refer to Fact Sheet #3 - *Information vs. Opinion*.

Situational exercise

Two people are debating. The first person claims the Earth is flat and uses scientific terms taken from astronomy that suggest she is very knowledgeable about this subject. The second person says the first person is wrong and the Earth is round.

These two people are expressing two different opinions, but these two opinions don't have the same value. How do we know this? How do we know the Earth is round and this isn't only an opinion?

The debate can then be extended to other scientific subjects. Ask students how they determine that scientific information is sometimes so sure and certain that they can say it isn't just an opinion.

"Fact checks" 1 to 3 below provide some answers to these questions. At this stage, it's important to remind students they can find videos or articles on the Internet that make claims about science or health as invalid as "the Earth is flat". Some may even use complex scientific vocabulary, which can give the impression that their claims are convincing.

Fact Sheet #7 - *Tricks used by those who produce fake news* could be used before this Fact Sheet. You can see that basic fact-checking can be used for information in general, whether it comes from YouTube or from serious journalistic reporting.

BASIC FACT-CHECKING

What questions should you ask yourself when information about science is involved — including health, nutrition or the environment?

Let's imagine a news item or a video that reports on a revolutionary "discovery", a miracle drug or a food that is supposed to benefit health or a person's appearance.

Is a scientist cited?

Too often, the author of this news item or the YouTuber settles for claiming that "researchers affirm" or "studies say". Be suspicious if no expert is cited or if there are no hyperlinks that let you check the information easily.

The source of the information cited should always be specified. This doesn't take much space and it's useful for people who read or listen to the posts we share!

If scientists are cited, have they published a study?

Sometimes the scientist who is cited may express an opinion on a subject. "According to biologist Anne Bell, this drug seems effective." Or: "Biologist Anne Bell is convinced this drug is effective."

Sometimes the scientist who is cited in the news item or in the video may have published a study on the subject: "The drug is effective, biologist Anne Bell concludes in the study she published recently." Or: "The research performed by biologist Anne Bell concludes that the drug is effective."

Studies are stronger than opinions. The knowledge we have in different fields comes to us from the accumulation of studies conducted by scientists. Why do these studies always have more value than an opinion, even if it's expressed by a scientist? Because as soon as a study is published in a scientific journal, it can be read and analyzed

by other scientists who are experts in the same field. Some of these experts will even try to repeat the same study to see if they will also arrive at the same results.

Is this the first study on the subject, or were there others before?

A study that arrives at encouraging results is good. But if it's the very first time a study obtains these results, we have to be careful. Maybe in a few months a second study will reach the conclusion that there were errors in the first study. This happens.

Sometimes a report or a video will tell us: "The study conducted by biologist Anne Bell concludes the drug is effective. But other studies will be needed to confirm these results."

Attention: Unfortunately, not all reports contain this detail. Media or Youtubers have often become enthusiastic too quickly about a study that was contradicted by other researchers a few months later. In science, we often must wait to have two studies, or even several studies, before jumping to conclusions.

Be suspicious of celebrities!

A great many claims on health or nutrition are made by TV, movie or social media celebrities. Too often, these celebrities base their recommendations for a treatment or a miracle food on their personal experience. It's important to remember: a celebrity's opinion has no scientific value. Not even if it comes from your favourite movie star!

Do they talk about a "miraculous", "revolutionary", "extraordinary" discovery?

Be suspicious! Scientists never use this type of vocabulary. You should also be suspicious of a website that uses too many capital letters and exclamation points in its headlines.

Are results on mice really encouraging?

In normal times, a new drug or treatment must go through years of studies before it is approved. Sometimes the first results on a future drug are described as "encouraging"... But if this drug has only been tested on mice to date, you should be careful.

What is the sample?

A study may have been done on 50 people. But it may also have been done on nearly 5,000 people. "The study by biologist Anne Bell concludes the drug is effective. It was conducted on 4,992 people."

Attention: The goal of these seven questions isn't to lead students to decide on their own whether the results of a scientific study are true or false. However, by asking themselves these few basic questions, they can sort through the avalanche of scientific or pseudoscientific claims coming at them from all sides (or that will soon bombard them when they use social media).

Getting past the first impression

If the "discovery" mentioned in the article or in the video is very encouraging, or even "spectacular", here's an easy trick to look into it. By using Google, you can try to find other reports or videos that would have reported on the same research. You could therefore see if they refer to it with the same enthusiasm, or if they downplay it.

Also remember that there are journalists who specialize in science. This means they have developed tricks over time to avoid falling into certain traps and to fact-check more complex information.

EXERCISES

EXERCISE 1

Read this excerpt from a fictitious article and identify the information that seems reliable and the information that seems doubtful. "Doubtful" doesn't mean the information is false, but that it raises a doubt. Explain why it raises a doubt.

Here's what Dr. April Fisher proposes to beat the coronavirus: the most important vitamin, vitamin D, followed by vitamin C, which are both widely used against winter colds. They improve your resistance to the coronavirus, Dr. Fisher affirms.

She also recommends taking this very promising food supplement, which you can find on her website: Natureletine, an effective antiviral. Major Canadian scientists say that Natureletine has been the most promising substance in fighting COVID-19.

Suggestion: This exercise can be performed with concept cards, using the Popplet digital tool. The student creates a diagram containing reliable information and enters the nature of the fact-checking (as seen above). The student also produces a second concept card, this time for doubtful information, again adding the necessary fact-checking items.

EXERCISE 2

These 4 articles each contain 3 key pieces of information. Ask the students which of these articles they would share on social media and why.

- a) The first article reports on a miracle treatment against the flu. Dr. Fisher is cited. She has published a study of 500 mice.
- b) The second article reports on a promising treatment against the flu. Dr. Fisher is cited. She has published a study of 50 people.
- c) The third study cites George Clooney and Scarlett Johansson, who have tried this treatment. They were cured of their flu. They recommend it.
- d) The fourth study cites a 500-person study of a flu treatment. The results are promising. Dr. Fisher recommends it.

Suggestion: Have the students produce infographics on Canva, each based on the four articles above. Then present the creations to the entire group. Have the students discuss why they would or wouldn't share these different infographics on their favourite social media.

Additional exercise: The teacher may choose a journalistic article taken from a recent edition of a local or national media publication. (Avoid articles by columnists, because they express opinions). Ask the students to identify 1) the most important information in this article that would allow them to validate if it contains quality scientific information, 2) if there are points that would require more fact-checking, 3) if they would share this information (for those who already use social media). Then ask the students to explain their choices.

EXERCISES

EXERCISE 3 / DISCUSSIONS

If enough students already use social media, facilitate a discussion period based on these questions:

- a) How do you check the identity of a person on Instagram? On TikTok? On WhatsApp? On Reddit? On their favourite social media?
- b) What explains why a person posts fake news?
- c) What distinguishes these platforms from traditional media regarding the fact of whether or not they publish fake news?

Suggestion: Take advantage of these questions to have the students form teams of two and make an audio recording. Using the Anchor app, the learners can easily create a podcast and keep traces of their discussions.

TWO ADDITIONAL EXERCISES

The *Rumour Detector* proposes these two exercises:

1. One of these news items is false. How can you identify it? (bit.ly/3gJxIGy)
2. April 1: the Rumour Detector test (bit.ly/3eGtlKy)

ANSWER KEY

1.

- She doesn't cite a study anywhere. "Major Canadian researchers" is too vague;
- "She proposes" and "she recommends" are opinions;
- "For sale on her website": Does the author of this article obtain income from the sale of this product?

Note that all the information on the use of these vitamins in winter could be true. But that doesn't prove these vitamins are treatments against a new virus.

2

"D" would be the most interesting article, at first glance, given the study on people. But "B" is still better than "A" (study only on mice) and "C" (celebrities' opinion).

3

a)

No matter what social media is mentioned, the basic formula applies to all scientific or other information: click on the author's name, or on any other options the platform offers to direct us to his or her "bio" (biography). This may be called "Contact" or "Who are we?", but the idea is to find something that lets you know who is behind this account.

There's a downside: even if you find information, it's possible there will be very little. The goal of this exercise is to develop the student's reflex of checking the identity of an author (or a website) before sharing information on social media.

b)

- To defend an ideology or a cause they care about;
- To harm someone (a political opponent, for example);
- To raise doubts about part of the population: "this person isn't honest", this company is suspicious, etc.;
- To earn money (the more clicks they attract, the more advertising revenue they can expect).

c)

Among other possible answers: serious media are subject to rules of ethics and codes of conduct that forbid them to publish falsehoods (see Fact Sheet #1 - *What are information media?*). The media can also be held liable in court if they harmed a person's reputation.

To go further

- [How to make a clinical trial say whatever you want](https://bit.ly/2UM9nqk) (bit.ly/2UM9nqk) by The Pharmacist
- [Conseils santé douteux: 6 indices à repérer](https://bit.ly/2AGJctL), (bit.ly/2AGJctL), by Agence Science-Press (Dubious health tips - 6 clues to identify them)
- [On vous parle d'une étude scientifique? Voici 8 questions à poser](https://bit.ly/3sC65W7), (bit.ly/3sC65W7) by Agence Science-Press (They're telling you about a scientific study? Here are 8 questions to ask)
- [Études scientifiques: lesquelles sont les plus solides?](https://bit.ly/2XLjk8s) (bit.ly/2XLjk8s) by Agence Science-Press (What scientific studies are the most solid?)