**Identifying and Citing Sources: Pre-Class Activities**

**Introduction**

Choosing suitable sources for any piece of scientific writing – especially a scholarly one, such as a lab report or essay – is extremely important. This is because these sources will help add relevant detail to your writing, provide more information for interested readers, and allow you to justify any arguments you make by providing evidence. The credibility of your writing will directly relate to the quality of the sources you cite, which is why it is so important that you are able to identify the different types before you cite them (**primary, secondary** and **tertiary**).

**Primary Sources**

Primary sources are *primary* because the information in them comes directly from the person/people responsible for it (i.e. it is ‘primary’ because nobody else has adapted the message intended by the original author(s)). For this reason, you don’t need to worry that the message has been misinterpreted by anyone else. This is one main reason why integrating primary sources in your writing is generally encouraged over other types.

Typically, in science, primary sources are journal articles that detail the results and interpretations of original scientific research. Because an article must be peer-reviewed before appearing in these journals, you have a fair sense that it is a high-quality contribution to scientific thinking in the topic it addresses; after all, if the information did not move theory forward in some way, or was poorly put together, it would be unlikely to make it past the eyes of reviewers and be accepted for publication in a journal. This is another main reason why using primary sources is generally advised.

**Secondary Sources**

Secondary sources are compiled solely from primary sources but the key difference is that the author(s) do not need to have conducted the research reported in these primary sources. For example, you could perform a literature search of all primary journal articles published in the past two years on the topic of tropical fish evolution, and then summarize the latest knowledge on this topic into one article. You would not have performed any of this research, but because it came from primary sources, your summary would be a secondary one.

These are known as *review articles.* Such articles are common in science journals, and are often a great way of reading the latest developments in a specific topic. However, you must remember that the author(s) of these secondary sources have summarized the primary material (**and therefore interpreted it**), which means you will be taking the accuracy of these summaries on trust if citing them.

Because it is a requirement that all the primary sources are cited and provided in the reference list of the secondary source, you can refer back to the original articles to ensure they have been accurately summarized. Using secondary sources in your writing is acceptable – so long as you take this important step.

**Tertiary Sources**

Tertiary sources are compiled from the primary and secondary literature, and are often written in slightly less scientific terms to appeal to a non-specialist audience. For example, most textbooks use information from primary and secondary sources but don’t generally provide references to these sources, so it is not possible to check for the accuracy (or to consult these to add more specific detail to the points they make).

For this reason, it is generally unwise to use tertiary sources for scholarly writing, but they are often useful to help you gather basic information about certain topics. In addition, they are often useful for providing the level of information needed for written work targeted at non-specialist audiences (e.g. information sheets, blog posts, newspaper articles).

**Grammar Squirrel Video Resource**

For a quick recap, and for **more tips** on how to differentiate between the different types of sources, watch the Grammar Squirrel video [here](https://www.youtube.com/watch?v=0207D87De7I).

**Questions 1, 2, 3, 4 and 5 (1 mark each, 5 marks total)**

For each of the following questions, decide whether the type of source listed is a primary, secondary or tertiary source.

**Q1:** A journalistic article in the local newspaper about the threat of earthquakes that cites original research and includes summaries and case studies from a variety of other sources.

**Q2:** A M.Sc. thesis written by a student that details how he developed and tested a new, sensitive early-warning system for measuring earthquakes.

**Q3:** A chapter in a history textbook, which lists details of all the major earthquakes that have occurred over the past 500 years.

**Q4:** A conference review document written by an organizer that details key messages delivered by 15 different speakers about their own, earthquake-related research, and which includes a reference list.

**Q5:** A technical, detailed blog post written by one of the speakers, about his recently conducted experiments and results, which includes a reference list.

**Question 6 (5 marks)**

To help you think a bit more about why it matters whether you use primary, secondary, or tertiary sources, try to fill in the following gaps by choosing the most suitable word from the options available:

***When communicating science, it is never/occasionally/usually/always acceptable to use tertiary sources to provide evidence to support what you are saying. Primary sources are always/typically/sometimes the best option for finding the most accurate/relevant/interesting information about original research; however, secondary sources – particularly review articles that summarize many primary research articles in a certain topic – are good places to find relevant/technical/old references to primary papers. These secondary sources are often accurate, but you should scan the references list and read the original articles that have been cited to be sure; after all, it is very important not to misquote/misrepresent someone else’s work.***

**Question 7 (2 marks)**

**Think about and name one scientific topic** that interests you. This could be something broad, such as ‘sexual selection’ or something very specific, such as ‘sexual selection in the Black Grouse (a species of bird)’.

The ideal topics are those that are neither too broad nor too narrow; if they are too broad, it can be hard to find relevant information in primary sources, but if they are too specific, there are not so many primary sources out there for you to find. To gain both marks for this question, you must choose a topic that fits somewhere in between.

**Question 8 (2 marks)**

You must now find at least two **primary sources** that could help you add content to a piece of writing about this topic. You should bring these (and any others you find) to the in-class lesson/workshop, where you will begin writing a short piece about your chosen topic that correctly cites information from these sources.

Use [Google Scholar](https://scholar.google.com) to find two **primary sources** that contain information that would be useful for you to include in a piece of writing about your chosen topic.

List these two sources by including the name of the article, the journal it appears in, the name(s) of the author(s), and the year that it was published. If you can, also include the hyperlinks to these two articles.

*Note: You will learn a lot more about how to search for relevant sources, about other search tools that are useful, and about how to cite these sources appropriately, in the in-class lesson/workshop.*

**Avoiding Plagiarism by Crediting Sources in Written Work**

There are three main types of plagiarism, and it is very important that you are aware of these and avoid them. All three types (**unintentional, blatant** and **self**) relate closely to how you credit the sources you have used to add content to your work.

Whereas you might **unintentionally** plagiarize someone else’s work by failing to cite such work correctly, you can **blatantly** plagiarize the same work by passing it off as your own; be mindful that it is just as serious to copy your friend’s homework as it is to copy someone else’s published ideas without crediting them as the source of that information. Finally, you can plagiarize **yourself** by copying work completed for one assignment and handing it in to form part or all of another; you should always check with an instructor, but make sure if you duplicate written work that you credit the fact it has appeared/been handed in at a previous time.

These three types of plagiarism can be committed as a student or as a research scientist. For example, a scientist who has published work in the scientific literature would be committing self-plagiarism by submitting a journal article that copies text from a formerly published article, just as a student would commit the same type of plagiarism by duplicating text from a former assignment.

One of the toughest things to understand is exactly when and what you need to cite in your writing. After all, when you read journal articles, you will realize that not every single sentence includes a citation with a reference to a specific source. Table 1 below provides a quick checklist to help you decide which information requires a citation.

**Table 1: How to decide what you must cite in your science writing**

|  |  |
| --- | --- |
| What you NEED to cite | **What you DO NOT NEED to cite** |
| * Ideas, concepts, opinions, etc. of others
	+ Direct quotes, summaries, paraphrases
 | * Common knowledge
	+ General (Shakespeare wrote Hamlet)
	+ Field-specific (a double bond is stronger than a single bond)
 |
| * Facts used as evidence
	+ Findings, conclusions, theories
 | * Facts that are easily verifiable, and for which no controversy exists (Penicillin was discovered in 1928)
 |
| * Distinctive or authoritative ideas
 |  |

**Question 9 (6 marks)**

List three different pieces of information from your primary sources (at least one from each) that might be useful to include in your piece of writing about the topic (**3 marks**). Then, justify whether or not you would need to credit the source that these came from to avoid plagiarism (**3 marks**). **Make sure you include at least one piece of information that you would not need to be cited, to show that you are able to discern the difference between these types of information.**

**In-Class Activities – Reminder**

**Remember to bring:**

1. The two (or more) primary sources that you found about your chosen topic
2. A laptop or tablet to work with, as you will be doing more literature searches in the in-class activities.