The evolving library

Dear fellow biochemists: on this instalment, I would like to arouse some reflection related to the use of bibliographic sources by our students, as well as our role as counsellors, trainers, in that practice.

What sources do our students consult? When you have proposed them to produce and present some assignment or exercise, it is very likely that you have been confronted with some or all of these situations:

- The work does not quote any bibliographical sources at all.
- Bibliography includes some textbooks, but without specifying any chapter or pages.
- Bibliography is made exclusively of web pages.
- The internet sources are identified only by their URL address.

As an amusing story, a real experience: one of my students delivered a written assignment among which bibliography list were "es.wikipedia.org" and "www.google.es", like that, without any more details. When I tell them about this in the classroom, they laugh; I hope the anecdote will leave an imprint on their minds and prevent them from ever doing that.

So, what is happening? Probably, nobody has ever taught them, beyond a brief generic mention, how to select bibliography, how to discern the quality of the sources, how to cite the references. We simply throw them the task: "Prepare a report on such a topic, up to so many pages, and don't forget to include a bibliography section".

What we can contemplate, as part of our teaching role, as trainers of future scientific professionals, is to instruct the students so they learn how to:

- Evaluate the reliability of a source, specially when it is on the internet. This is not so difficult for them, we just weed to attract their attention and induce them to come considering it: for example, I tell them "it is not the same a page by a university professor than *The Lazy Man's Corner* (see note) or *Pete's Blog*"; they understand it immediately. [Note: this is the literal translation of the

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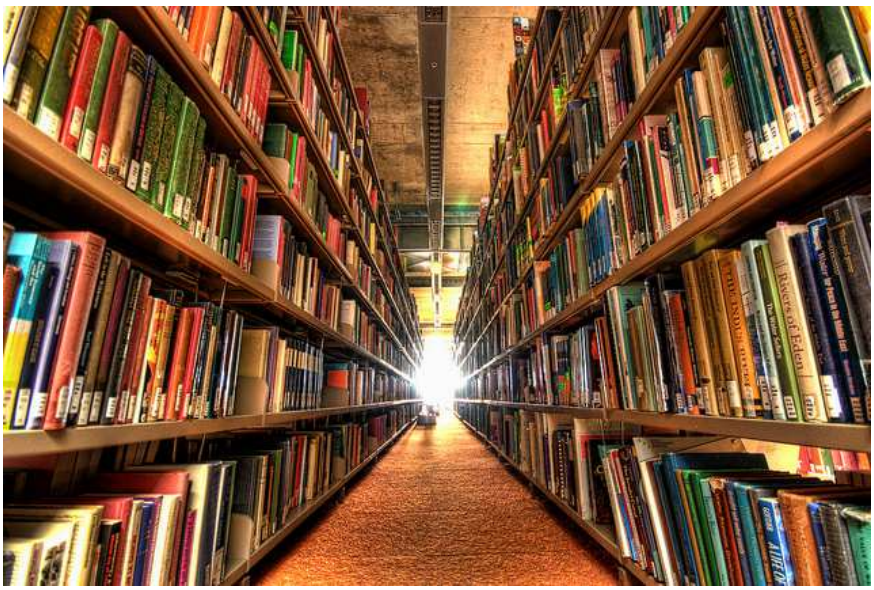

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This article was first published, in English and Spanish, in SEBBM Journal, issue 182, December 2014 (the Journal of the Spanish Society of Biochemistry and Molecular Biology). It is republished here after the journal's original website was taken down.

doi:10.5281/zenodo.1860963

name of a well known website where student notes and ready-made assignments are posted]

- Combine several sources in order to check information, and always include some book.
- Develop a systematic habit of writing down every source used. An answer like "I found it on the net" is unacceptable. Apart from being imprecise, you will quickly forget where was it found, and it will be impossible to find it again –even for you, not to say for those who read you. Not only it must be well documented, but also, once the source has been written down, it will be feasible to raise a debate about its reliability.
- Document the bibliography, and give it an information-rich format: title, author, institution that published it –both when it is a traditional publication in a periodical journal or a book and when it is an electronic document and information in the internet.

I do not pretend to disregard the reliability of the traditional bibliographic sources, a product of careful and laborious elaboration, of a review and validation by third parties; but simply, I find it hardly realistic to pretend in current times that students will not use the internet as an information resource. Maybe one can impose that bibliography includes some books, but it is weakly reasonable to be more strict. Please think on which sources you use when you look up something. How many books are there in your shelves? Are they enough for you? Do you visit the library when you must check some topic, or do you rather turn to keyboard and search engine? Of course, years of experience allow us to appreciate what we find on the net as either useful or rubbish. Let's then teach our students how to attain that judgement!

I makes me uneasy to see documents (even syllabi and official academic pamphlets for courses) with a "bibliography" heading followed by another, "internet links". Are these per chance not bibliography? Among other things, I am worried that this might reveal a subconscious believe of the kind "this shows I am up to date with technologies, and indeed these web things are attractive" but really "what is worthy is just the books". Maybe well established electronic courseware is not worthy of being at the same level than the reference textbook, with its static images and text?

We need to change our minds: internet is a reality that is there to stay, and it is a source of information, which quality will have to be ascertained per case –as we judge the quality of a journal, without that meaning we put it in a

Box 1

Teaching how to document bibliography

For articles in periodical journals that publish in electronic format, there is no need for special advice, since they have all characteristics of the printed journals (authors, volume, pages...). As an bonus location element for citations, we may learn and then teach the meaning of doi (digital object identifier).

For other kinds of electronic material, which lack such editorial format and the stability, other specific criteria must be adopted. We can teach the students some *good practices*:

Write down the full address (URL). This is an essential item, since it allows the reader to reach the source you have used. In the case of very long or complex addresses, one can opt for getting a "short url" from some of the servers that offer this service (Bit.ly, Goo.gl, TinyURL.com)

Always include the date when you have looked it up. This is important from a formal viewpoint, since the content may change with time (in contrast to articles in electronic journals). The format to indicate this follows common models or is specified in the instructions, if you are using a certain bibliographic style. Phrases like "Checked on d/m/y" or "Access date: d/m/y" are common and sufficient.

Try and find in the webpage who is the author. Unfortunately, many pages do not say it explicitly. If the author is not stated, you might find him or her in the higher level pages (such as the index page for the material or course; see also suggestions in Box 2)

Whenever possible, extract a title and a date of publication or update of the content. Apart from being much more informative for the reader, that allows a format more uniform with other kind of citations.

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Box 2

Teaching how to assess reliability of the sources

This is a key training for the students, and we can plan it as an assignment for the student or as the object of a reduced group session in the classroom (*Bologna style*). In order for it to be a formative experience, it will be relevant to include a face-to-face session for discussion and for orientation by the instructor. Some suggested guidelines:

Find out who is the author of the material.

Check if the author belongs to a teaching institution, a society, an organization... which is his/her professional qualification.

Observe the location of the webpage looking for an identification:

- finding in the page some links to the table of contents or index page of the section or course it belongs to, to the main or home page;
- in lack of the former, track the URL upwards, i.e., go up in the folder tree structure where the page belongs to, until you find a *parent* page that has information;
- analyse the URL to see in which environment it is published: for example, they may be teaching pages, in which case the server will belong to a university.

Verify in other places any information you have found in a site which reliability may be questioned, so to avoid erroneous or biased information.

separate listing. We must get used to treat electronic sources in the same conditions as the printed ones, and to teach that to our students. Of course, it must be done sensibly and soundly.

Another thing I would recommend is, when we suggest "internet links", not to just provide the URL, but to add a description, an orientation about what can be found there, which is its merit, how to use it. We should not push the students into the net as if we throw them into the unknown. For the electronic materials not to be incidental, they must receive value and context. A possibility to enrich the enquiry process, as I have already mentioned in previous articles, is to propose some kind of question or activity that forces to use the referenced material –in a small personal research task– in order to find out something or solve a problem.

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doi:10.5281/zenodo.1860963