I recently delivered a course titled “Research Methods for Engineers.” Part of the course was a description of the scientific method, the importance of rigorous scientific work and accurate reporting, proper referencing techniques, and the like. In the course, students were required to select a published paper, write a review of the paper, and produce a detailed plan of a project that would extend the work. The student submissions were very good, and highlighted some interesting aspects of the papers they reviewed across many engineering disciplines. Some related to reflections of how the research work was validated, and much related to inadequate referencing. This problem is a recurring theme in many disciplines [1, 2].

Along the same lines, I seem to be reviewing more and more papers these days, and it seems that I am either getting more particular or some papers submitted are really not well written. In discussion with Randy, I decided to write this little piece for his column. In the end, it all comes down to professionalism and professional ethics. The students in my course highlighted some of my own publications and many others. So, here are some tips from me about writing papers ethically.

So, you have done some exciting new work and it’s time to present a conference paper and/or to publish in a journal. Obviously, the next step is to write up the work. There are some pretty obvious things to attend to when you write. Here is a suggested check list:

1. Did all the authors listed make a significant contribution to the work, have they read the near-final draft, and are they happy with its contents? (Could every listed author explain the main details of the paper?)

2. Has any of the material been copied directly from other publications (even your own) without copyright approval and a direct reference, together with quotation marks? (Failure to do so is a criminal act in most countries.)

3. Have any of the results been “adjusted” to look better with some points omitted, error bars missing or not discussed, experiments not repeatable, etc. (i.e., has the data been falsified?)

4. Are you confident that the results are correct? This usually means validation through one or more of the following techniques: published results from others, experimental work matching theoretical work, theoretical work checked in the limiting cases, numerical modeling validated using alternative grid meshes, etc. (This is the basis of the scientific method.)

5. Have you included enough information in the paper so that a skilled practitioner could repeat your work without contacting you? (This is a principal reason why the open literature exists worldwide for all of us in this international community of scholars).

Okay, so you know and abide by all of this and understand the basic principles listed above.

During the review process, journal reviewers are asked to comment on the referencing in the paper to prior important work. Before the Internet, this was quite difficult because of different languages, the difficulty in getting access to a comprehensive set of
all paper copies of the literature in the field around the world, etc. I believe it is now unprofessional (even negligent) to submit a paper if you have not spend five minutes doing an electronic search of the literature. The five minutes might lead to five hours, or a decision not to submit the paper if the results turn out badly, and you discover what you thought was new in fact was the subject of detailed investigation by other groups recently, or even in the distant past. So, what should you do in these five minutes?

My favorite Web search engine is Google Scholar, because it is quite comprehensive and it gives citation statistics, but feel free to use another, as I agree citation statistics are not the only issue. So, my instruction is:

1. Type in www.googlescholar.com
2. In the search line, enter the keywords you propose to use for your paper.
3. Google Scholar will give some of the highest-cited papers and books first. Look at the first 10-15 papers in the list.
4. Ask yourself the question, “Have I cited this reference in my paper?” If “yes,” then look at the next paper on the Google list. If “no,” get a copy of the paper and rationalize to yourself and your coauthors why this paper has not been referenced, and/or include this reference in your paper.

5. If your reference list is too large, then maybe you have to look for the most important (oldest? founding? exemplar?) papers in the field, and include them, rather than the others you originally included.

With my new-found knowledge and interest in this issue brought to me by my students, I plan to use this technique when I review papers from now on. Don’t be surprised if your paper is returned with a comment relating to inadequate refereeing of the literature.

If you have comments or suggestions, Randy and I would be interested to hear from you: I’m sure Randy would love some additional inputs to his column. Happy writing and happy reviewing!

References