

The challenge of scientific publication

All researchers have a strong desire to publish their findings, to share ideas and to present their results to others working in the field. Research is the bedrock of science, the fuel of social, economic and technical development, and the evidence that underpins strategy, development and regulation. A strong publication record, that must be measured in quality rather than quantity, can open doors and enhance career prospects, while publication statistics provide a tangible measure of professional achievement that is central to professional career development.

Good quality research takes time. A clear research plan is essential, and a rigorous and properly documented methodological approach to experimental design. A thorough review of the existing literature and discussions with senior colleagues will help improve the research plan and may identify better or more appropriate lines for investigation or approaches to study. If statistical analysis is going to be necessary it will be wise to consult a professional statistician before, not after, the study begins in order that the study design is optimised for statistical evaluation. Ethical and financial issues must be carefully considered. The proposal may require the independent scrutiny of an Ethics Committee before work starts. If the work has commercial impact, now is the time to seek professional assistance and obtain protection for your idea and secure the opportunity to exploit the outcome of your research. Ethical considerations are particularly important, and deserve special mention. Research involving study on humans must conform to the World Medical Association Declaration of Helsinki and its ethical principles for research involving human subjects.ⁱ Similarly, studies involving animals must adhere absolutely to the international norms for ethical conduct in the care and use of animals. Research that fails to demonstrate adherence to these standards will be immediately rejected. Other ethical considerations apply. Researchers must remain aware of the inevitable shortage of research funding and have an obligation to use those funds wisely, considering also those who may invest in future research projects that rely heavily on your results. Unethical research behaviour sufficiently serious to warrant disciplinary action or sanctions from academic institutions and journals regrettably still occurs. Editors and publishers must do everything possible to identify and eradicate this – the Committee of Publication Ethics (COPE) states that ‘Editors [together with the editorial panel and referees] have a prime duty to maintain the integrity of the scientific record’ and ‘do their utmost to identify publication misconduct in submitted and published articles’.ⁱⁱ

The highest standards of probity are required also of the journal Editor and Referees, and of the Publisher. Though the traditional model of research publication has not involved charges to authors, but has instead relied upon library and personal subscriptions to print journals, the internet has permitted the rapid growth of a newer open publishing model that enables free access for all while charges are borne by the authors. Both publishing models can be successful, though very recently it has become apparent that there may be commercial pressures from open access publishers to accept poor quality submissions in order to secure revenue.ⁱⁱⁱ There is, therefore, a parallel ethical commitment for the Editor and Editorial Board, and the Publisher, to avoid this situation and consider every submission on merit alone. This may create difficulties for Publishers but money must never be placed before quality - a successful journal will flourish because of the quality of its content, which reflects the activities and standards of the Editor and Editorial Board, and of the Referees.

When all the results are in, researchers will be keen to prepare a draft manuscript with a view to publication. Without doubt, that draft will be the first of many. Consult with colleagues; perhaps test the presentation and your interpretation of the data at a local meeting, or consider the submission of an abstract to a suitable conference. Check carefully that the manuscript conforms closely to the style requirements of your chosen journal, paying particular attention to the accuracy of all references. The use of units of measurement, abbreviation and the layout and structure of the manuscript must conform precisely to the journal requirements; errors at this stage may result in immediate rejection, no matter how good the research might have been. Assistance may be required in grammar and spelling. Authorship is an often contentious issue. Have all authors made a significant contribution to the work? Overall, about one fifth of authors with their names on top of a published paper have made little or no contribution, which junior researchers who have done much of the work may be excluded from authorship.

Once a manuscript is submitted, journal editors face many challenges. Does the subject match the journal? The aim and scope of the *International Journal of Engineering, Science and Technology* (IJEST) is to provide an academic medium and an important reference for the advancement and dissemination of research results that support high-level learning, teaching and research in the fields of engineering, science and technology. Original theoretical work and application-based studies, which contributes to a better understanding of engineering, science and technological challenges, are encouraged. It is entirely appropriate therefore that the Editor, Editorial Panel, Referees and Publisher measure against this standard. Is this original and high quality research? Does it offer new information, or merely repeats existing observations? More fundamental questions must also be addressed. Does the

work meet all mandatory ethical standards? Is there evidence of plagiarism, or of duplicate publication? If all appears well, Editors will invite two or more independent Referees to examine the manuscript. Referees will be senior scientists with experience in the area of study. They should be detached from the study and host institution, and must declare immediately any conflict of interest. To ensure properly blind peer review, Referees will be unaware of the identity of the author(s) and their host institution as that information will be stripped from the manuscript before distribution.

The role of the Referee is to provide specialist advice to the Editor, mainly regarding the quality of the research and standard of presentation of the manuscript. Referees or Peer Reviewers may offer specific advice regarding improvements in style, the use of tables and charts, and can suggest improvements or identify weaknesses that require additional work. They must be impartial in their examination of submitted manuscripts. Referees will be selected for their experience in a particular field; Editors will generally invite at least two and often three reviewers to examine each manuscript to ensure diversity of opinion and eliminate bias. Referees and Editors are generally busy people with full time jobs in addition to these additional duties and cannot, and generally will not, provide extensive and detailed assistance to rewrite a defective manuscript. Most Referees will quickly detect submissions that are grossly incomplete or inadequate and for those rejection is likely. For those manuscripts showing promise, immediate acceptance is unlikely as almost always there will be need for some clarification or correction or some further improvements. For other manuscripts, more extensive work may be required and Referees should offer clear guidance and reasoning for their concerns, with an invitation to resubmit the manuscript within a few weeks or months depending on the nature of the revisions required.

Be prepared for some difficult questions. Referees will search for incomplete or inconsistent data, may expect greater detail and additional clarification, or a shorter and more succinct presentation. The author's view of clarity will often differ from that of the Referee, who may demand further detail. What does 'ordinary' mean, define 'regular', how normal is 'normal', what is 'usual', or 'average' or 'typical'? Data presented in Tables or Figures should not be repeated in the text. A particularly common error is a failure to address some earlier but highly relevant publications, especially where this is contradictory to the current findings, or to misquote references and take the findings of others out of their intended context. It is perfectly acceptable to express a different opinion or to move away from established theory, but to do so needs the backing of a meticulously presented hypothesis, sound reasoning and almost certainly a substantial body of rigorously conducted experimental evidence to support an alternate hypothesis. Do make certain that all experimental data is properly documented and retained for scrutiny, ever after publication of your manuscript. An important aspect of the publishing process is the essential declaration of conflicts of interest. Think carefully about this. Who funded or supported the work? Was there any input from commercial sponsors, and what links exist between the authors and those with a commercial interest in the study?

At every stage, the Editor and Referees will be diligent to the possibility of research fraud. Plagiarism is unacceptable, and though the work of others can and probably will be cited in your own manuscript, this should be properly referenced. Simply copying the work of others is totally unacceptable and will inevitably result in an investigation that may involve the Editorial Board liaising with the senior officers of the authors' host institution or professional body. Duplicate publication is similarly unacceptable, though regrettably this still occurs as authors play the 'numbers game' to increase the number of publications and expand their *Curriculum vitae*. This distorts or skews the literature and misleads fellow researchers. Research fraud is a serious matter, and even if it escapes detection during the rigorous refereeing process wider scrutiny by the Journal readers may identify issues not previously apparent, leading to investigation and a formal retraction even years later.

Despite all of these very many hurdles, some proportion of submitted manuscripts will be ready for publication. Take care with the final preparation of typescripts and check proofs with the greatest care. This is the last change to correct any errors or inaccuracies. Only then is it time to sit back with pride at your success in overcoming all of the very many hurdles that must be faced when considering scientific publication. But self-congratulation cannot last for long as the next research project may already be in progress and we at the *International Journal of Engineering, Science and Technology* (IJEST) will look forward to your next submission.

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ⁱ World Medical Association. Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. <http://www.wma.net/e/policy/b3.htm> (accessed 19 July 2009)

ⁱⁱ Committee on Publication Ethics (COPE). COPE code of conduct. <http://publicationethics.org/code-conduct> (accessed 19 July 2009)

ⁱⁱⁱ Grant B. OA publisher accepts fake paper. <http://www.the-scientist.com/blog/display/55756/> (accessed 19 July 2009)