Measuring Academic Impact

Whether you are a young graduate student deciding on your future career path, a postdoctoral fellow exploring the academic job market, an assistant professor up for tenure promotion, a mid-career faculty member envisioning future research goals, or a senior faculty tracking the journey—you have undoubtedly tried on many occasions to examine and to gauge your research success and impact. The same goes for academic departments when dealing with hiring or promoting faculty, both with the goal of picking winners. But how does one measure academic impact? This is the question that I have asked myself many times and discussed with colleagues from different departments and universities across the globe over the past several years. Although almost everyone agrees with the importance of academic impact, there is no generally accepted definition of impact and ways of "measuring" it. With the help of the Internet, citation counts, h-index, and total impact factor (*i.e.*, sum of the journal impact factor for all the published papers) of a researcher can be readily obtained with a simple search. This availability of data has encouraged some people and departments to use such "quantitative" means of selecting their candidates or promoting their young faculty, with little or no emphasis on external evaluations of scholarship. In such examples, the most popular metric used is the total impact factor, sometimes with a correction term incorporated to take into account the authorship listing for each publication. Taking this approach, however, has major shortcomings and flaws as it does not take into account the researcher's intellectual contributions, nor the quality and significance of the work. As we all know, even in the best journals, questionable or incorrect results are inevitably sometimes published through a peer-reviewed process. Journal impact factors measure the visibility and quality of journals, not the quality of the researcher. In some cases, a small minority of papers are responsible for the great majority of the impact factor of the journal. Ultimately, it is better to publish papers in the venue where it reaches the right audience, rather than mindlessly tracking dubious journal metrics.

> *Impact = Importance $\times$ Influence*

The most elegant description of academic impact that I have heard is from my colleague at UC Berkeley, Jitendra Malik, who defined impact with a simple qualitative expression, *Impact = Importance $\times$ Influence*. Here, *Importance* is the relevance and the significance of the field of research—looking at the larger body of science and the choice of problems selected to be answered. After all, academic research should be transformative and "high-risk, high-reward" in its goals that could potentially lead to important advancements in fundamental science and/or practical applications. *Influence* describes the scientific and intellectual contribution of the researcher to the discipline, taking into account the originality of the work in advancing the field. *Importance* and *Influence* are equally important in defining the overall *Impact*. There are metrics, such as citation counts and h-index, that can be used as guidelines in conjunction with other attributes when judging impact. Citations are not good measures across widely different disciplines (*e.g.*, chemistry *vs* electrical engineering), but in the same subfield, they can be reasonably meaningful. In the end, however, it is the academic reputation and standing of the researcher that defines their impact. Publishing in the top (*i.e.*, most read and cited) journals of the field and presenting conference talks and seminars are two effective *mechanisms* to ensure visibility of the work, especially for younger scientists.

Ali Javey
Associate Editor

Disclosure: Views expressed in this editorial are those of the author and not necessarily the views of the American Chemical Society.