

## The Impact Factor

The ranking of universities and the measurement of research output have become major features of contemporary academia. This makes sense in contemporary cultural-economic terms. There is an urge to stratify performance partly to justify different levels of financial remuneration and investment but also to simplify in single indicators what otherwise could be intellectually divisive and politically inconvenient arguments about whom and where is "better" or "worse." Fields, departments, and universities can be characterized in terms of their relative "productivity" by using journal citation counts. Rather like credit-rating agencies such as Moody's in the financial world, Thomson Reuters (the publisher of the Web of Science and of journal impact factors) has the power to decree who is up and who is down in the world of research and of journal ranking.

This competitive model has come of age at precisely the same time that the number of journals has exploded and that universities have become involved in formal ranking exercises to receive government funding (as with the Research Assessment Exercise [RAE] in the U.K.) or faced increasingly daunting fiscal conditions (as in the U.S.). Some refer to this as the rise of an "audit" culture in which an accounting logic has replaced the more informal and, one must say, often patronage-driven, systems of qualitative evaluation that once prevailed. The dramatic increase in the numbers of universities, researchers, and journals has probably had something to do with this shift. Much of it, however, has also been driven by political pressure to both limit overall public funding and direct what there is towards the apparently more profitable subjects, universities, and corporate applications.

The "impact factor" is central to the new world of scholarship. Each year, Thomson Reuters extracts the references from over 9,000 journals and calculates the impact factor for each journal by dividing the number of citations to articles published

in a given journal in the previous two years by the number of articles published in that journal over the same time period. This is interpreted as a measure of the journal's effect in its field and the overall extent of its intellectual influence. In fact, the score can be manipulated by, for example, increasing the number of review articles and editorials relative to substantive articles because they tend to generate more citations than do primary research articles. More importantly, journal editors who use the review process to encourage authors to cite previous articles in the journal and external rankings of journals by universities and processes like the RAE that privilege some journals over others make the impact factor something other than a simple measure of journal quality. In particular, the mysteries of single- and double-blind peer review, when the personal integrity of editors is often their sole guarantee, adds to the opaqueness of the meaning of the impact factor. Editors have a major stake in recycling through citation what they have published before.

The pressure to begin articles by citing what exists in a narrow range of journals as opposed to thinking outside the proverbial "box" can also have the perverse effect of discouraging innovative thinking. Indeed, the combination of electronic publishing and the rise of the impact factor is narrowing the range of articles referenced and creating a bias towards citing recent articles in a restricted range of journals in all fields (J. Evans, "Electronic publication and the narrowing of science and scholarship," *Science*, 321, 18 July 2008). Who reads entire journals any more, looking to experience the joy of serendipity, particularly when those journals have low impact factors?

Yet, governments and universities are increasingly using impact factors to rank

universities and research fields as a whole, notwithstanding the problems I have noted. Those of us who sit on university personnel committees face a particularly problematic trend: the use of one quantitative indicator, journal impact factors, to judge the relative research performance of individual faculty. It is nonsensical to think that the quality of an article has a one-

to-one relationship with the presumed quality of a journal as measured by the impact factor. Nevertheless, hiring, faculty promotions, and grant awards are all increasingly dependent on evidence of publication in high-impact journals. This thereby encourages high rates of initial submission to these journals, with authors moving progressively down the hierarchy

of journals when they are rejected, thus wasting time and energy for all involved.

Let us hope that papers will increasingly be evaluated pre-publication only for technical accuracy and after publication without reference to impact factors. Both ritual invocation of peer review and the rise of the impact factor have become significant barriers to appropriate evaluation of scholarship. Open access publication, such as that pioneered by ACME in geography, and careful reading of selected publications by review boards could help turn the tide. What is clear is that scholarship cannot be evaluated by numerical means alone. As Albert Einstein reputedly said: "Not everything that can be counted counts, and not everything that counts can be counted." Bear this in mind the next time an editor, publisher or university president waxes lyrical about their impact factor. ■



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