

## Another $h$ -type index for institutional evaluation

Prathap<sup>1</sup> proposed to use two different types of  $h$ -indices for institutional evaluations: a level-one  $h$ -index ( $h_1$ ) and a level-two  $h$ -index ( $h_2$ ). The level-one  $h$ -index is equal to  $h_1$  if the institution (this is the set of all its researchers) has published  $h_1$  papers, each of which has at least  $h_1$  citations. The level-two  $h$ -index is  $h_2$  if the institution has  $h_2$  researchers, each having an individual  $h$ -index which is at least equal to  $h_2$ . If an institution has just one or two high-level scientists, then its  $h_1$  value will be high but its  $h_2$  will be very low. In this way the combination of  $h_1$  and  $h_2$  yields useful information about the research structure of an institution. As usual, it is best to consider only articles published during a given period and citations received during a corresponding citation window. Here we propose a slight variation on this idea.

With each scientist in an institution, we associate the set of articles that cite at least one of this scientist's articles (again only articles published during a given period and citation received during a corresponding citation window). For each scientist, this number of citing articles is

a characteristic number. Ranking these characteristic values from the highest to the lowest gives a list for which an  $h$ -index, let us call it  $h_3$ , can be derived. This index combines both the impact and the volume of research in the institution: the amount of citing documents reflects the impact, while a higher number of published documents increases the likelihood of a higher  $h$ -index. It is indeed well known that, in practice, the higher the number of publications, the higher the  $h$ -index<sup>2</sup>.

Taking not all citations, but only the number of different citing articles into account reduces, but does not eliminate, the influence of self-citations, of within-research-group citations, and of citations to highly related articles, as the latter are usually cited in the same documents. We think these are good properties, especially for institutional evaluation, as self-citations or within-group citations should not be removed; yet their influence should be reduced. A more technical advantage of counting citing documents and not citations is the reduced effect of errors in references. One correct reference to the

work of an institution in a citing document includes this document, while possibly incorrect references in the same reference list have no influence.

A note of caution: the proposed procedure makes no sense when the number of scientists in the group (institution) is so small that all scientists' characteristic numbers are higher than the number of scientists in the group. That is why we make this proposal for larger entities such as an institution and not for a research group, which might be too small. The same caveat applies for Prathap's  $h_2$  index.

1. Prathap, G., *Curr. Sci.*, 2006, **91**, 1439.
2. Hirsch, J. E., *Proc. Natl. Acad. Sci.*, 2005, **102**, 16569–16572.

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## Thinning boundaries between disciplines, award of D Sc degrees and out-dated university rules

One of the conditions for registering for the degree of D Sc in Mumbai University is that the candidate should be a science graduate. If from a stream other than science – read arts, commerce, one can register for D Litt, but the thesis cannot be on a scientific subject. This condition contradicts the current emphasis on interdisciplinary and multidisciplinary research. For example, archaeology, traditionally a part and parcel of the history discipline and therefore belonging to the arts faculty, now draws heavily from scientific inputs: botany for plants remains, fossil foodgrains and pollen grains (palynology),

zoology (palaeontology), geology and chemistry for dating technologies and soil science (pedology). Likewise, geography, conventionally an arts topic, is presently grouped together with geology as earth sciences. These instances show that strict compartmentalization of earlier times like botany, geology, chemistry is no longer valid at higher levels of research (Masters, Doctorate). Marie Curie received two Noble Prizes, one in chemistry, another in physics. Ecology is a glaring example of an interdisciplinary approach.

Therefore, there is an urgent need to amend the age-old university rule, to

permit candidates to change from one stream to another at higher levels of research. After all, what counts is the end result – the quality depending on one's versatility. The doctoral thesis (D Sc) could be evaluated by several international experts, irrespective of the disciplines offered at the graduate and post-graduate levels.

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