Limitations of Citation Metrics and New Developments

by the NUS Libraries Cited Reference Team
23 – 25 April 2013
Session Outline

- Review of Topics covered
- Limitations of Citation Sources
- Use of Citation Metrics in Staff Evaluation
- Limitations of Citation Counts
- Alternative Citation Metrics
- New developments in Citation Measurement & Analysis
- Issues with Names & the ORCID Initiative
- Promoting yourself
Review of Sections Covered

- Determining Citation Metrics
  - Total Publications, Citation Count & h-index
- Analysis of Publication and Citation data
  - Author, Affiliation, Country & Subject Area
- Determining Impact Factors of Journal Publications
- Determining Citation Metrics of Institutions and Departments
Limitations of Citation Sources

- Coverage of Publications Indexed
  - Type
  - Number
  - Time Period
  - Geographical Range
  - Language
  - Subject

- Errors in Indexing
  - Typographical
  - Transcription
## Comparing Citation Sources

<table>
<thead>
<tr>
<th></th>
<th>Web of Science</th>
<th>Scopus</th>
<th>Google Scholar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journals</td>
<td>&gt; 12,000</td>
<td>~ 19,500</td>
<td>No. not stated -</td>
</tr>
<tr>
<td>Proceedings</td>
<td>&gt; 148,000</td>
<td>~ 250</td>
<td>Journals, Papers, Theses, Acad. Books,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reports</td>
</tr>
<tr>
<td>From 1900 -</td>
<td></td>
<td>From 1996 -</td>
<td>Not stated</td>
</tr>
<tr>
<td>Worldwide</td>
<td>Worldwide</td>
<td>Worldwide</td>
<td>Not stated</td>
</tr>
<tr>
<td>N. American bias</td>
<td>50% from Europe, Latin America and Asia-Pacific</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English Language bias</td>
<td>English Language bias</td>
<td>Multiple Languages</td>
<td></td>
</tr>
<tr>
<td>(Chinese Science Citation DB)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary</td>
<td>Multidisciplinary</td>
<td></td>
<td>Multidisciplinary</td>
</tr>
</tbody>
</table>
“I have repeatedly stressed that the use of citation data in evaluating individual performance is valid only as a starting point in a qualitative appraisal”

“Citation analysis is not meant to replace such knowledgeable [peer] judgment but to make it more objective and astute”.

Citation Frequency as a Measure of Research Activity and Performance, Current Contents #5 Jan 31 1973 in Essays of an Information Scientist Vol. 1, p.406-408 1962-73
Use of the h-index in Staff Evaluation

“Obviously a single number can never give more than a rough approximation to an individual’s multifaceted profile, and many other factors should be considered in combination in evaluating an individual.”

“This and the fact that there can always be exceptions to rules should be kept in mind especially in life-changing decision such as the granting or denying of tenure.”

Hirsch, J.E. An index to quantify an individual's scientific research output, PNAS , vol. 102 no. 46 (2005)
Limitations of Citation Counts

Citation counts alone are unable to determine the:

- Full range of a Researcher’s activity & performance
- Whether Citations are due to a longer Publication History
- Researcher’s currency of research & recent performance
- Standing or prestige of the Journals the articles are published in or cited by
- If Citations are viewed either + or -
- Ranking of Researchers from different disciplines

Putting Citation Counts in Perspective

Title: PROTEIN MEASUREMENT WITH THE FOLIN PHENOL REAGENT
Author(s): LOWRY, OH; ROSEBROUGH, NJ; FARR, AL; et al.
Source: JOURNAL OF BIOLOGICAL CHEMISTRY Volume: 193 Issue: 1 Pages: 265-275 Published: 1951
Times Cited: 301,829 (from All Databases)

http://www.jbc.org/content/280/28/e25.full

as at 25 Mar 13
“...it is flattering to be the ‘most cited author’ but I am afraid it does not signify great scientific accomplishment...

Although method development is usually a pretty pedestrian affair, others doing more creative work have to use methods and feel constrained to give credit for the same…”

Caveats of the Impact Factor

- Assumption that a paper published in a “high impact” journal must also be of excellent quality
- No correlation between publishing in a “high impact” journal and the citations an article receives
- Citation profile of journals often skewed
- Not for comparison across subject categories
- May be subject to manipulation by journal Editors

Elliot Shubert (2012)” Use and misuse of the Impact Factor, Systematics and Biodiversity. 10:4, 391-394
### Significant Inflation of Impact Factor

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Citations</th>
<th>Impact Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>260</td>
<td>2.385</td>
</tr>
<tr>
<td>2008</td>
<td>201</td>
<td>2.051</td>
</tr>
<tr>
<td>2009</td>
<td>6,091</td>
<td>49.926</td>
</tr>
<tr>
<td>2010</td>
<td>6,520</td>
<td>54.333</td>
</tr>
<tr>
<td>2011</td>
<td>245</td>
<td>2.076</td>
</tr>
</tbody>
</table>

![Graph showing Impact Factors over years]

[1]. Title: *A short history of SHELX*  
Author(s): Sheldrick, George M.  
Times Cited: 29,972 (from Web of Science)  
Find It! @ NUS Libraries [View abstract]

[2]. Title: *The Protein Data Bank: a historical perspective*  
Author(s): Berman, Helen M.  
Times Cited: 80 (from Web of Science)  
Find It! @ NUS Libraries [View abstract]

European Association of Science Editors (EASE) Impact Factor Statement

EASE statement on inappropriate use of impact factors

The journal impact factor was developed as a means to measure the impact of scientific journals [1 2]. Over time, its use has been extended to measuring the quality of scientific journals, the quality of individual articles and the productivity of individual researchers [3 4]. Impact factors are nowadays even used in academic appointments, to evaluate grant applications and to allocate other financial support for research programmes [5 6].

The impact factor, however, is not always a reliable instrument for measuring the quality of journals [7 8]. Its use for purposes for which it was not intended, causes even greater unfairness [9–12].

Therefore the European Association of Science Editors recommends that journal impact factors are used only – and cautiously – for measuring and comparing the influence of entire journals, but not for the assessment of single papers, and certainly not for the assessment of researchers or research programmes either directly or as a surrogate.

## Citation Metrics Variants & Alternatives

<table>
<thead>
<tr>
<th>Citation Metric</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>M-quotient</strong></td>
<td>Accounts for different lengths of academic careers</td>
</tr>
<tr>
<td><strong>Contemporary h-index</strong></td>
<td>Adds an age-related weighting to each cited article. Older articles = Lower weight</td>
</tr>
<tr>
<td><strong>Individual h-index</strong></td>
<td>Normalizes the h-index by a factor that reflects the average number of co-authors in the paper</td>
</tr>
<tr>
<td><strong>G-index</strong></td>
<td>Gives more weight to highly-cited articles</td>
</tr>
<tr>
<td><strong>Eigenfactor /SCImago</strong></td>
<td>Considers the prestige of the journal based on the ranking of the sources of the incoming citations</td>
</tr>
<tr>
<td><strong>Journal Rank (SJR)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Article Influence Score</strong></td>
<td>Measures the average influence, per article, of the papers in a journal</td>
</tr>
<tr>
<td><strong>Source Normalised Impact per Paper (SNIP)</strong></td>
<td>Accounts for subject differences by weighting citations based on the total number of citations in a subject field (Citations in subject field less likely to receive citations are given more weight)</td>
</tr>
</tbody>
</table>
Towards Article-level Metrics

“A move away from journal-level metrics to article-level metrics is certainly welcome. A researcher’s work should be judged on its own merits, not necessarily the company it keeps within a journal’s pages”


David Crotty
Senior Editor
Oxford University Press
New developments in Citation Metrics - Altmetrics

Altmetrics (derived from Alternative metrics) and Article-Level Metrics

Altmetrics track the impact of scholarly works through:

- Citations
- Usage of the article through views/saves
- Social bookmarking and dissemination activity (e.g. via Cite-U-Like, Mendeley)
- Media and blog coverage
- Discussion activity and ratings (e.g. mentions)
- Peer comments (e.g. F1000 Prime)
- Software, Slides and Datasets etc... (e.g. ImpactStory)
Identifying events that impact self-efficacy in physics learning

So far Altmetric has seen 4 tweets from 4 accounts with an upper bound of 5,135 combined followers.

- NSBP @BlackPhysicists 3,130 followers
  Identifying events that impact self-efficacy in physics learning http://t.co/nijdzo0i physics #education 27-Dec-2012

- anthony perry @tonyperry 300 followers
  Modeling Instruction and Physics Self-Efficacy: http://t.co/hysUXArP Love this approach (and how it validates my Master's Project :) ) 28-Dec-2012

- Julie Schell @julieschell 449 followers
  Identifying events that impact self-efficacy in physics learning http://t.co/CgIoBZJ3 science #per #ecresearch 29-Sep-2012
Altmetrics -Moving Forward

Further understanding and research required:
- Separate the **popularity** of a research from the **quality** of research
- Correlation of **usage metrics** and **scientific impact**

Elliot Shubert (2012)” Use and misuse of the Impact Factor, Systematics and Biodiversity. 10:4, 391-394

Issues with Names

- What are some issues with using Names for database searching?
  - Not unique (Author name ambiguity)
  - Family/Last names may change with marital status
  - Have cultural differences in name order
  - Inconsistent use of first-name abbreviations/initials
  - Different alphabets or writing systems

http://www.nature.com/nature/journal/v462/n7275/full/462825a.html
Open Researcher and Contributor ID (ORCID)

Solves name ambiguity by issuing unique identifiers

Registry launched in Oct 2012

Enables linking to existing author identifier services (e.g. ResearcherID & Scopus Author ID)

Bidirectional exchange of publication information between ResearcherID and ORCID

Assist scholars and institutions manage academic information and provide both with more control over their own record of scholarship.

http://blogs.bmj.com/bmj-journals-development-blog/2012/10/19/orcid-an-end-to-author-ambiguity/
Increasing your visibility

☐ Use a consistent name with initials for publications

☐ Maintain an updated CV containing a list of Affiliations and Publications

☐ Consider registration and linking to Researcher Bibliographic databases

http://www.researcherid.com
http://orcid.scopusfeedback.com
Feedback for the session

- We value your feedback on this session.
- Please take a few moments to complete the survey form at:

  http://libguides.nus.edu.sg/citedref
Thank you

If you have any questions, please contact:

<table>
<thead>
<tr>
<th>FASS</th>
<th>Tim Yap Fuan, <a href="mailto:timyf@nus.edu.sg">timyf@nus.edu.sg</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>SDE</td>
<td>Hayati Abdul - <a href="mailto:hayati@nus.edu.sg">hayati@nus.edu.sg</a></td>
</tr>
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<td></td>
<td>Aaron Tay – <a href="mailto:aarontay@nus.edu.sg">aarontay@nus.edu.sg</a></td>
</tr>
<tr>
<td>Biz Ad</td>
<td>Wong Kah Wei – <a href="mailto:kahwei@nus.edu.sg">kahwei@nus.edu.sg</a></td>
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<td>FoE</td>
<td>Karen Yap, <a href="mailto:karen-yap@nus.edu.sg">karen-yap@nus.edu.sg</a></td>
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<td>SoC</td>
<td>Kenneth Lim, <a href="mailto:kenneth.lim@nus.edu.sg">kenneth.lim@nus.edu.sg</a></td>
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<td>FoS</td>
<td>Kan Sok Cheng, <a href="mailto:sokcheng@nus.edu.sg">sokcheng@nus.edu.sg</a></td>
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<td>YLLSOM</td>
<td>Jonathan Pradubsook, <a href="mailto:j.p@nus.edu.sg">j.p@nus.edu.sg</a></td>
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