In defence of the standards of teaching and research in Indian universities in the context of international university rankings

Early this year, Times Higher Education (THE) published the world university rankings[1]. The Prime Minister of India has expressed his concern that not even one Indian university has figured in the list of top 200 universities in the world. THE ranks universities based on the citation data provided by Thomson Reuters. However, the criteria for ranking universities spawned criticism and was opposed during a national policy dialogue jointly organized by the Planning Commission of India, Ministry of Human Resource Development, Thomson Reuters, THE and the British Council, held on 23 May 2013 in New Delhi.

Opponents felt that the criteria adopted by THE were not justified for Indian universities as they excluded universities that did not teach undergraduates, taught narrow subjects and the research output was less than 1000 published articles between 2006 and 2010. It is to be noted that most of the Indian universities do not teach undergraduates and universities teaching agriculture, law, medicine and engineering were not taken into account. Also, Indian universities face challenges of limited resources and funding to churn out the desired number of publications.

To rank the universities five indicators were deployed and few individual indicators were considered. The five indicators taken into consideration were: (a) international outlook (7.5%); (b) research volume income reputations (18%); (c) citation research influence (30%); (d) teaching: the learning environment (30%) and (e) industry income innovation (2.5%). These indicators however do not fair well in the Indian context, opponents argue. For example, international outlook considered the ability of a university to attract undergraduate and postgraduate students from other nations, which remains elusive from most of the programmes offered by Indian universities. Secondly, the research volume income reputation was evaluated on the basis of research papers, income and number of staff members, analysed by Thomson Reuters – the largest source for evaluating peer-reviewed publications and the source of the annual journal impact factor. Many of the Indian journals have less citations and low impact factor, leaving out the chances of increased visibility or reporting high-end research. Influence of citation research is mostly based on *Web of Science* (*WoS*) database to rank the universities[2]. The ranking methodology adopted is empirical in nature, questionable and not suitable for Indian universities, and is decided by citations which may hold good for foreign universities to attract funds and international students.

During the symposium, the absence of representatives from Indian universities was felt, while those representing THE and Thomson Reuters took centre stage, the issue of funding was raised by a handful of university representatives. In order to revamp the scenario, there is a need to first reorganize infrastructure and research facilities in Indian universities. It is also important to focus on NAAC evaluation, which emphasizes on teaching and not on the number of publications. The Indian Government, both state and central, should encourage quality teaching and research instead of getting carried away by international rankings.

The Central Government may provide combined scientific instrumentation facility for several universities in a state/region, wherein all the research scholars can utilize the facility effectively. This would enable the scholars to get accurate data without delay. It will pave the way for publication of more standard research papers in the country.

1. The *Times Higher Education* world university rankings 2012–2013; www.timeshighereducation.co.uk/world-rankings/2012-13/world-ranking
2. Thomson Reuters research analytics connecting research to impact provided by Thomson Reuters; ip-science.thomsonreuters.com

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Ranking of IITs in materials science and engineering

Surappa[1] calculates the citations impact of the IITs in the area of materials science research to be 4.93 and compares it with the value of 3.57 for engineering in an earlier analysis by Prathap[2]. He concludes that this indicates that the ranking of IITs in engineering research is lower compared to their ranking in materials science research.

A more effective way to make such comparisons is to use a second-order indicator[3]. We start with more contemporary data directly from Essential Science Indicators (http://esi.webofknowledge.com/home.cgi) using the latest available update (as of 1 July 2013 to cover a 10-year plus four-month period, 1 January 2003–30 April 2013). For each institution, data are listed for papers (*P*), citations (*C*) and citations per paper (usually denoted by impact *i*). In each case we identify the top 100 institutions ranked by citations during this period.

The second-order exergy indicator[3], $X = iC$, is arguably the best for research performance, as it takes into account both quality (*i*) and quantity (*P*). In each

Table 1. Ranking of top institutions in materials science and engineering research using data from Essential Science Indicators updated as of 1 July 2013 to cover a 10-year plus four-month period, 1 January 2003–30 April 2013

Field	Rank	Institutions	*P*	*C*	*i*	*X*
Materials Science	1	Chinese Acad Sci	18,079	1,77,299	9.81	1739303.19
	2	Max Planck Society	3,650	74,385	20.38	1515966.30
	3	MIT	1,997	52,615	26.35	1386405.25
	4	Univ Calif Santa Barbara	1,050	36,080	34.36	1239708.80
	5	Univ Calif Berkeley	1,451	42,167	29.06	1225373.02
	6	Univ Washington	925	32,170	34.78	1118872.60
	7	Natl Univ Singapore	2,782	51,598	18.55	957142.90
	8	Georgia Inst Technol	2,073	42,166	20.34	857656.44
	9	Northwestern Univ	1,619	36,036	22.26	802161.36
	10	Harvard Univ	967	27,445	28.38	778889.10
	…	…	…	…	…	…
	63	Indian Inst Technol	5,633	35,764	6.35	227101.40
	…	…	…	…	…	…
	87	Indian Inst Sci	1,524	14,135	9.27	131031.45
	…	…	…	…	…	…
	100	Univ Sci & Technol Beijing	4,229	14,333	3.39	48588.87
Engineering	1	MIT	5,055	52,503	10.39	545506.17
	2	Stanford Univ	3,641	41,307	11.34	468421.38
	3	Chinese Acad Sci	11,521	70,541	6.12	431710.92
	4	Univ Calif Berkeley	4,697	44,020	9.37	412467.40
	5	Univ Illinois	5,813	48,524	8.35	405175.40
	6	Nanyang Technol Univ	6,773	45,996	6.79	312312.84
	7	Univ Michigan	5,011	39,550	7.89	312049.50
	8	Natl Univ Singapore	5,568	41,414	7.44	308120.16
	9	Georgia Inst Technol	5,783	41,949	7.25	304130.25
	10	Univ London Imperial Coll Sci Technol & Med	4,346	35,616	8.20	292051.20
	11	Indian Inst Technol	9,301	50,729	5.45	276473.05
	…	…	…	…	…	…
	100	Huazhong Univ Sci & Technol	3,326	14,245	4.28	60968.60

field, the value of *X* for each institution is computed and rankings done accordingly. Table 1 shows an abstracted list of how the leading institutions from India have performed in each category. While the IITs (identified by Essential Science Indicators as a single institution) are ranked at no. 11 in engineering, it is a poor 63 in the materials science list. IISc appears at no. 87 in this list, but does not figure in the top 100 in the engineering list.

1. Surappa, M. K., *Curr. Sci.*, 2013, **105**, 147–149.
2. Prathap, G., *Curr. Sci.*, 2011, **101**, 136.
3. Prathap, G., *Curr. Sci.*, 2010, **98**, 995–996.

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Lusi mud volcano, Indonesia

Mud volcanoes are geological structures characterized by emission of argillaceous material on the land surface or under water. Usually, there is sufficient water and gas, which makes the sediment semi-liquid and forces it up through the crustal openings as an outflowing mass of mud on the surface[1]. The formation of mud volcanoes is typically associated with geological settings where high sedimentation rates occur, for example, in compressional tectonic belts, submarine slopes and inverted back-arc basins[2,3].

One of the best present-day examples of mud volcanoes is the Lusi eruption in Sidoarjo, Indonesia. It began erupting 150 m from the Banjar Panji-1 gas exploration well at 5 a.m. on the 29 May 2006, two days after the Yogyakarta earthquake (5:54 a.m., 27 May 2006). It is still actively erupting gas, water and boiling mud. The mud volcano has caused flooding in several villages and has displaced 13,000 families along with a loss of 13 lives[4].

The cause of this particular eruption is not well understood. Thus it has fuelled the debate about the understanding of such phenomena and potentially, the role of earthquakes in initiating mud eruptions, because it occurred soon after an earthquake. However, a number of studies have demonstrated that mud volcano