

Review

Cumulative citations index, h-index and i10-index (research metrics) of an educational institute: A case study

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The graduation or ranking of higher educational institutes like colleges or universities are evaluated on the basis of different criteria. The most important criterion is research criterion. Higher educational institutes need to collect staffs and students' research publications, and also check their citations, h-Index, i10-Index and impact factors of journals. Even the evaluation committees like National Assessment and Accreditation Council (NAAC) expect higher educational institutes to give cumulative citation, h-index and i10-index, that is, research metrics. In order to get individual and cumulative research metrics like number of citations, number of citable documents, cites per document, h-Index and i10-Index, and impact factor of journals in an easy way, authors took the initiative to create Google Scholar profile of each faculty and then created Google Scholar account for the colleges adding links of all faculties' on the Google Scholar accounts. This innovative new strategy will benefit higher education institutes appearing for NAAC accreditation or re-accreditation, or other ranking systems by the instructions, guidelines and steps furnished in this report.

Key words: Citation index, i10-index, h-index, Google Scholar, cumulative citations, higher education, rankings, accreditation, Criteria III, research.

INTRODUCTION

In India, in the last decade, the numbers of universities and colleges have increased significantly. The latest statistics of higher educational institutes is 44 central universities (as on 15.1.16), 362 state universities (as on 29.6.17), 123 deemed to be universities and 260 private universities (as on 22.02.17), and a total of 11001 colleges, out of which, 9023 are under 2(f) and 12(B), and 1978 are under 2(f) but not included under 12(B) (as

on 30.04.17), and 602 autonomous colleges, 150 Community Colleges and 66 academic staff colleges (as on 31.3.17) (University Grant Commission, 2017a-h). To evaluate or rank these institutions as per their performance and output, different agencies like National Assessment and Accreditation Council (NAAC), All India Council for Technical Education (AICTE), National Board of Accreditation (NBA) and International Organization for

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Standardization (ISO), and recently introduced National Institutional Rankings of Ministry of Human Resource Development Government of India were put in place to rank their performance. All these agencies and bodies evaluate the higher educational institutes with regular frequency on the basis of their teaching, learning and resources, research, consulting and collaborative performance, graduation outcome, outreach, inclusivity and perception, etc.

In the case of universities, they are ranked at national as well as international levels. At the national level, they can be ranked by NAAC, ISO and National Institutional Ranking Framework (NIRF), and there are few agencies that perform ranking of universities from all over the world every year by applying specific criteria and methodology like 'Times Higher Education World University Rankings', 'QS World University Rankings', 'Centre for World University Ranking' (CWUR), 'World University Rankings', 'UI Green Metric World University Ranking', 'Kaggle World University Ranking', 'CWTS Leiden Ranking', 'University Ranking by Academic Performance' (URAP), etc.

In few cases, the university needs to be enrolled in the ranking system. Many un-enrolled universities are not evaluated in this system. The most suitable ranking system which is 'Webometrics Ranking of World Universities' is an initiative of Cybermetrics Lab that takes into account a number of factors that are often overlooked in university rankings and other assessments like research, teaching, employability, internationalization, facilities, online/distance learning, engagement, innovations, culture, access and specialist criteria like excellence to claim world class status.

Webometrics measure not only research output, including both formal (ejournals, repositories) publications and informal scholarly communication, teaching, the scientific impact of the university activities, but also, the economic relevance of the technology transfer to industry, the community engagement (social, cultural and environmental roles) and even the political influence.

The common and most important criteria to evaluate higher educational institute by all agencies and bodies is research initiatives, ongoing funded research projects and research output of faculties and students. To collect all information on this from all faculties and students followed by compilation and analysis is a tough task. Every higher educational institute appoints a committee for this criterion. This committee conducts review meetings, and they also ask faculties and students to send their publication list. There are many things the committee head needs to consider when calculating the total number of citations, h-index, i10-index and also impact factor of journals of all faculties, and then compile it to calculate the cumulative research metrics. Many institutes have their institutional repository that contains their faculty publications for reference purpose. But still, it is observed that not all staff or faculty members are

expert in this type of analysis.

Therefore, this study tried to provide simple techniques to face this criterion effectively in front of the committees with confidence and without much stress.

Objectives of this study

The main objectives of this study are:

1. To help all higher educational institutes to create and publish their cumulative research metrics.
2. To provide steps in creating institutional Google Scholar profile
3. To provide proper guidelines and precautions while creating cumulative research metrics and adding research publications.

Research

Research is an academic activity. It is an "original independent" investigation undertaken to contribute to knowledge and understanding, and in the case of some disciplines, cultural innovation or aesthetic refinement (Kothari and Garg, 2014). According to Clifford Woody, research comprises of defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and formulating hypothesis. It is an original contribution to the existing stock of knowledge paving way for its advancement. Research typically involves inquiry of an experimental or critical nature driven by hypotheses or intellectual positions capable of rigorous assessment by experts in a given discipline.

A research output

Research output is a particular dissemination, publication, presentation, communication or pathway in which research is made available to people other than the author. "Research outputs" (researchoutputs.auckland.ac.nz/default.html) is the system the university or higher educational institutes uses to record its staff research outputs and activities. Research output is divided into different categories like journal articles, conference papers/abstracts, poster presentations, chapters, working papers, thesis and dissertations, books, monographs, patents, compositions, internet publications, commentaries, editorials and confidential research output. Currently in many institutes, in-house repositories are being maintained using DSpace or E-Print Open Source Softwares. Many universities in developing countries give facility/platform/gateway to each and every students and staff to add their research output in institutional repositories. But still, these universities are not able to add all publications of their

faculty and staff. It depends on the willingness of faculty or staff to share their publications or research output. Similarly in Indian higher educational institutes, it is also observed that not all faculties give their research output from time to time. Every higher education institute has their own policies and procedures to preserve and disseminate intellectual property created by their staff and students.

Citations

According to Maier (2015), a citation is when one paper explicitly refers to another paper, and in that paper full reference or cited paper is given in the bibliography. According to Wikipedia, a citation is an abbreviated alphanumeric expression embedded in the body of an intellectual work that denotes an entry in the bibliographic references section of the work for the purpose of acknowledging the relevance of the works of others in the topic of discussion at the spot where the citation appears. Generally, the combination of both in-body citation and the bibliographic entry constitutes what is commonly known as a citation. Citations are important for the following reasons:

1. Citations are how authors give proper credit to the work and ideas of others.
2. People also count citations of a paper as an indication of how important or influential the paper has been.
3. To avoid plagiarism, it is compulsory to give credit to the original author by citing his/her sources in references. Apart from plagiarism, citations are extremely useful to anyone who wants to find out more about the ideas and where they came from.
4. Citing sources shows the amount of research you have done and it strengthens your work by lending outside support to your ideas.

H-index

The h-index is an index to quantify an individual's scientific research output (Hirsch, 2005). According to Wikipedia, the h-index is based on the set of researcher's most cited papers, and the number of citations that they have received in other people's publications. In calculating h-index, an attempt is made to measure both the scientific productivity and the apparent scientific impact of a scientist. On Google Scholar, the account of an individual researcher h-index shows the largest number h such that h publications have at least h citations at h times each. For example, a publication with five articles cited by 17, 9, 6, 3 and 2, respectively has the h-index of 3. The second column shows the recent version of the metric which is the largest number h such that h publications have at least h new citations in the last 5 years.

i10-index

i10-index is used only in Google Scholar, which is the number of publications with at least 10 citations. It is introduced by Google in 2011, and used to help gauge the productivity of a scholar. It indicates the number of papers an author has written that have been cited at least ten times by other scholars.

Google scholar

Google Scholar provides the search for all scholarly publications from many disciplines and sources like articles, abstracts, books, court opinions, from academic publishers, professional societies, online repositories, universities and institutions websites, patents, etc at one place and helps to find relevant work across the world of scholarly research. Using Google Scholar, we can explore related works, citations, authors and publications, locate complete document through the library or from the web, keep up with recent developments in any area of research using its advance search like year wise, including patents or citations options, keep track of citations, get graph citations over time, check who is citing our publications and can create a public author profile free of charge. Google Scholar also compute several citation metrics like h-index, i10-index and also ranks the documents the way researchers do, provide details of each documents, where it was published, how often and how recently it has been cited in other scholarly literature.

Google Scholar profile of individual scholar

Individual scholar or researcher is able to create his Google Scholar account using his G-mail. To make it authentic and public, he or she needs to add authentic institutional email id and verify it. After adding personal details and profile picture, a research scholar is able to add his or her authored publications directly from the list that appears or manually. He or she needs to select multiple groups if he or she has written articles under different names, with different groups of colleagues, or in different journals. All the publications available online appears in the listed groups.

Screenshot 1 is the Google Scholar profile of one of the staff of Modern College of Arts, Science and Commerce, Ganeshkhind, Pune, and India. The college has asked all staff members to create their Google Scholar Profile.

Research metrics of the higher educational institute

As discussed in the introduction part of this study, the common and most important criteria to evaluate and give ranking or grade to higher educational institute including

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Title	Cited by	Year
Synthesis of silver nanoparticles using <i>Dioscorea bulbifera</i> tuber extract and evaluation of its synergistic potential in combination with antimicrobial agents	154	2012
<i>Gnidia glauca</i> flower extract mediated synthesis of gold nanoparticles and evaluation of its chemocatalytic potential	79	2012
Antidiabetic activity of <i>Gnidia glauca</i> and <i>Dioscorea bulbifera</i> : Potent amylase and glucosidase inhibitors	67	2011
Rapid efficient synthesis and characterization of silver, gold, and bimetallic nanoparticles from the medicinal plant <i>Plumbago zeylanica</i> and their application in biofilm control	48	2014
Synthesis of gold nanoanisotrops using <i>Dioscorea bulbifera</i> tuber extract	32	2011

Citation indices	All	Since 2012
Citations	752	738
h-index	14	14
i10-index	22	21

Bar chart showing citation growth from 2011 to 2017:

Year	Citations
2011	~10
2012	~20
2013	~30
2014	~40
2015	~50
2016	~60
2017	~70

Screenshot 1. Google Scholar profile of an individual scholar.

universities, colleges and research institutes by all agencies and bodies is research and research output of faculties and students. The higher education institutes have Bachelors, Masters, Doctorate and Post Doctorate courses. In higher education system, teaching and research are complimentary to each other.

Research enhances the quality of teaching/learning process. Involving students in research activity enables them to understand the truth and reality of a subject or topic taught to them in the class room. Therefore, research is an integral part of higher education (Pathan, 2005).

It is expected from the higher educational institutes to create research culture among the faculty and students together with teaching. Teachers should engage in research initiatives such as applying for funded projects, providing seed money for research initiatives, conducting seminars, symposia, workshop, conferences, providing support services for the faculty involved in research, deputing faculty to complete their research degrees and efforts to publish their research output in reputed journals and file patents. To obtain all information on this from all faculties and students, compelling and analyzing it is a tough task. Every higher educational institute appoints a committee for this criterion. These faculties' conducts meetings, and also ask faculties and students to send their publication list (Stella, 2001). Most of the institutes classify and then compile the publications as a bound volume to present to the accreditation committee and

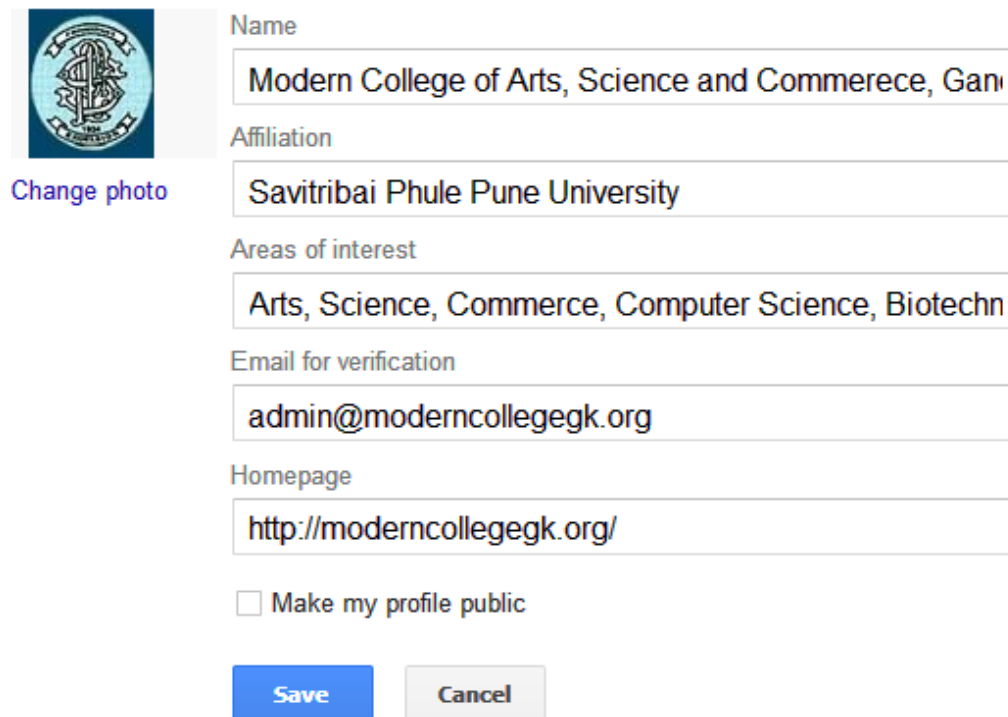
prepares list of publications as a compendium.


Google scholar for institutions research output

As discussed earlier, individual scholars can register on Google scholar using their Gmail, and create their research profile which gives their research metrics like number of citations, h-index, i10-index, citations per publications with their links and details. It provides them with an easy platform to add their new publications automatically, and intimate on them their new citations on their email. Herein, a strategy to use Google Scholar platform to create Institutional Research Metric was reported. Instead of individual research metrics, this strategy will enable the adding of publications of all faculties of the institutes in Google Scholar Account which will create Institutional Research Metric, that is, cumulative research metric like number of citations, h-index and i10-index of all faculties and researchers of that Institute at one place and can make it available for the public on their website too.

Prerequisites of creating Google Scholar account of an institute

Like individual Google Scholar account, to create Google Scholar account of an institute, the institute needs to




 Change photo

Name
 Modern College of Arts, Science and Commerce, Gan

Affiliation
 Savitribai Phule Pune University

Areas of interest
 Arts, Science, Commerce, Computer Science, Biotechn

Email for verification
 admin@moderncollegegk.org

Homepage
 http://moderncollegegk.org/

Make my profile public

Save Cancel

Screenshot 2. Google Scholar profile information of an academic institute.

follow these steps:

1. Appoint a staff to handle this responsibility, preferably from the research background.
2. Add information about an institute together with its affiliation and logo.
3. Add articles of staff members online or manually.

Appointment of responsible staff member to manage Google Account

Educational institution needs to assign this work to a senior staff that has research background and internet knowledge, and should be friendly with all staff members and students. Librarian or Research Committee member can be appointed for managing Google Scholar account of an academic institute.

Creation of Google Scholar account

In the case of Modern College of Arts, Science and Commerce, Ganeshkhind Pune, their librarian was appointed to manage the Google Scholar account. Using the library Gmail account, the college created the Google Scholar account. Once the Google Scholar is created there is need to add the Institution's information like name, affiliation, areas of interest, and website along with

college logo. Then, the Google Scholar account is verified with the office sending the official email id of the college. Screenshot 2 shows how the information and college logo are added to the Google Scholar profile of the college. The Google Scholar account email is verified with the official email id. Google Scholar checks whether the account is created by authentic persons and checks its genuineness.

Adding publications

Before adding the publications of staff members, the Google Scholar account administrator should prepare a faculty publications list.

Publications are added using add button. Here, example of addition of publications of academic staffs of Modern College of Arts, Science and Commerce, Ganeshkhind Pune are shown. Once option of add articles is selected, two options will be gotten. One in which, the online indexed article by staff members can be added directly by selecting from the bulk of articles under each staff member and the other is to add article manually. Screenshot 3 is an example showing how to fetch or link online indexed articles in Institution's Google Scholar account. Here, the staff appointed to manage Google Scholar account should know which articles are written by the staff.

For example, as seen in the image, the articles of

Screenshot 3. How to fetch or link online indexed articles in Institution's Google Scholar Account.

scholars Varsha Shriram, Sanjay, S. Kharat and Vinay Kumar are displayed. Since Varsha Shriram is not a faculty member of Modern College, Ganeshkhind his articles should be ignored, and all the 28 articles by her should be removed. A total of 18 indexed article by scholar Sanjay, S. Kharat are displayed in Screenshot 4 which are already added, so one needs to check all articles one by one, and add the authored publication list of that staff.

Only staff publications are selected. Google shows all articles with the name of the staff members and his co-authors too (Screenshot 5). Instead of add all articles, there is a need to click on see all articles and select one by one from the list.

It is advisable not to make it public unless it is verified and complete. Once adding all faculty publications correctly is completed, then, college Google Scholar profile can be made public. Screenshot 6 is the sample of Google Scholar profile of Modern College of Arts, Science and Commerce, Ganeshkhind, Pune where it is updated regularly.

Publications as a bench marking system

As discussed in research output here in higher education system apart from teachers' publications, there are lots of gray literatures available. Only patents and journal articles are covered in the Google Scholar. If an academic institution wants to increase its number of citations, h-index, and i10-index then they need to

increase their number of publications. Here are few tips to increase publications and research metrics of the academic institutes.

Publishing gray literature

Institutes should publish selected assignments given to the students as mini reviews, commentaries, editorial column and short communications in the journals. The selected project reports of students can be published in journal article form or book form with some correction. Now, there is a practice of publishing conference and seminar proceedings in the form of book with ISBN or in a journal as a special issue. But academic institutions that are not able to do this still have option to publish the seminar or workshop or conference report in any journal. Current Science, University News publishes reports of seminar, conference and workshops are held in higher education. Teachers and students should publish their work in open access and indexed journals so that Google Scholar can fetch their publications and index them.

Publishing assignments of students

Institutes should publish the selected assignments of students either in Institutional repository or as mini reviews, commentaries, editorial, short communications, projects, workshop and seminar reports in journals like current science.



Modern College of
Arts, Science and
Commerce,
Ganeshkhind, Pune

Add all 28 articles

Remove all 28 articles

See all articles (4 articles are already in your profile)

Sanjay S Kharat

Freshwater fish fauna of Koyna river, northern Western Ghats, India

BV Jadhav, SS Kharat, RN Raut, M Paingankar... - Journal of Threatened Taxa, 2011

Qualitative phytochemical screening of *Gnidia glauca* (Fresen) Gilg. Plant extract

SS Kharat, PB Kumkar, RR Siddhesh, KS Sonawane - Int J Pharm Bio Sci, 2013

Remove all 18 articles

See all articles (All articles are already in your profile)

Vinay Kumar

Differential response of two scented indica rice (*Oryza sativa*) cultivars under salt stress

S Danai-Tambhale, V Kumar, V Shiram - Журнал стресс-физиологии и биохимии, 2011

Antioxidant and DNA damage protecting activities of *Eulophia nuda* Lindl.

V Kumar, M Lemos, M Sharma, V Shriram - Free Radicals and Antioxidants, 2013

Add all 517 articles

Remove all 517 articles

See all articles (5 articles are already in your profile)

Mukund Sharma

Free radicals and antioxidants

S Kumar, M Lemos, M Sharma, V Shriram - Adv Appl Sci Res, 2011

Antioxidant and DNA damage protecting activities of *Eulophia nuda* Lindl.

V Kumar, M Lemos, M Sharma, V Shriram - Free Radicals and Antioxidants, 2013

Add all 213 articles

See all articles

Screenshot 4. Articles already added in Google Scholar Account and selected from the list.

Google Scholar interface showing a list of articles. The search bar contains "Modern College of Arts, Science and Commerce, Ganeshkhind, Pune". The interface includes navigation buttons (←, Select, ADD, Remove...), a page indicator (1 - 100), and a sidebar with "Add article groups" and "Add articles" options. The list of articles includes:

- Prospects for solvent extraction processes in the Indian context for the recovery of base metals. A review
V Kumar, SK Sahu, BD Pandey - Hydrometallurgy, 2010
- Review of hydrometallurgical recovery of zinc from industrial wastes
MK Jha, V Kumar, RJ Singh - Resources, conservation and recycling, 2001
- Crystal structure of a eukaryotic (pea seedling) copper-containing amine oxidase at 2.2 Å resolution
V Kumar, DM Dooley, HC Freeman, JM Guss, I Harvey... - Structure, 1996
- Energy efficient clustering algorithms in wireless sensor networks: A survey
V Kumar, S Jain, S Tian - IJCSI International Journal of Computer Science Issues, 2011
- Remediation options for the treatment of electroplating and leather tanning effluent containing chromium—a review
A Agrawal, V Kumar, ED Pandey - Mineral Processing and Extractive Metallurgy Review, 2006
- Enhanced proline accumulation and salt stress tolerance of transgenic indica rice by over-expressing P5CSF129A gene
V Kumar, V Shriram, PBK Kishor, N Jawali, MG Shitole - Plant Biotechnology Reports, 2010
- Combustion synthesis and luminescence investigation of Na₃Al₂(PO₄)₃:RE (RE= Ce³⁺, Eu³⁺ and Mn²⁺) phosphor
IM Nagpure, KN Shinde, V Kumar, OM Nitwasabornwa... - Journal of Alloys and Compounds, 2010
- Learning-based approach to real time tracking and analysis of faces
VP Kumar, T Poggio - Automatic Face and Gesture Recognition, 2000. ..., 2000
- KNN based machine learning approach for text and document mining
V Bijalwan, V Kumar, P Kumar, J Pascual - International Journal of Database Theory and ..., 2014

Screenshot 5. How to select the relevant articles of staff members from the online list provided by the Google Scholar index.

Modern College of Arts, Science and Commerce, Ganeshkhind, Pune
Savitribai Phule Pune University
Arts, Science, Commerce, Computer Science, Biotechnology
Verified email at moderncollegegk.org - Homepage

Title	Cited by	Year
Synthesis of silver nanoparticles using <i>Dioscorea bulbifera</i> tuber extract and evaluation of its synergistic potential in combination with antimicrobial agents S Ghosh, S Patil, M Ahire, R Kitture, S Kale, K Pardesi, SS Cameotra, ... International Journal of Nanomedicine 7, 483	157	2012
Enhanced proline accumulation and salt stress tolerance of transgenic indica rice by over-expressing P5CSF129A gene V Kumar, V Shriram, PBK Kishor, N Jawah, MG Shitole Plant Biotechnology Reports 4 (1), 37-48	98	2010
Production and properties of an alkaline, thermophilic lipase from <i>Pseudomonas fluorescens</i> NS2W N Kulkarni, RV Gadre Journal of Industrial Microbiology and Biotechnology 26 (6), 344-348	88	2002
<i>Gnidia glauca</i> flower extract mediated synthesis of gold nanoparticles and evaluation of its chemocatalytic potential S Ghosh, S Patil, M Ahire, R Kitture, DD Gurav, AM Jabgunde, S Kale, ... Journal of Nanobiotechnology 10 (1), 17	79	2012
Antidiabetic activity of <i>Gnidia glauca</i> and <i>Dioscorea bulbifera</i> : Potent amylase and glucosidase inhibitors	68	2011

Citation indices	All	Since 2012
Citations	1402	1210
h-index	21	18
i10-index	41	37

Bar chart showing citations from 2009 to 2017. The x-axis represents years from 2009 to 2017. The y-axis represents the number of citations. The bars show a general upward trend, with a significant increase in 2016 and 2017.

Screenshot 6. Sample of Google Scholar Profile of an academic institute.

Publishing articles in open access and indexed journals

Articles published in open access journals and indexed journals gets more citations, and Google Scholar listed them to increase citation making it easy to add in Google Scholar profile of the institute, it is advisable to insist that staffs should publish their research work in open access and indexed journals.

Role of affiliation

Every faculty and student should mention their institution's name as an affiliation. At times, staff members doing M. Phil and Ph. D from other universities should write the universities affiliation as Research Scholar. If faculty and staffs mention their institution's name, then it becomes easy to add their articles in Institutions Google Scholar account, and they do not need to add it manually.

Name change

Many female faculty members and research students change their name after marriage. So Institutes should have data of both names. It is advisable for female staff to keep same name in all published papers. It will be

useful to them in order to manage their individual Google Scholar account.

Research gate profile/Academia.edu profiles

It is advisable for all research faculties to create their research scholar profile of Research Gate of Academia.edusites where their publications are made available to all research communities, and it helps them to get more citations; also, these articles gets index in Google Scholar sometimes.

Open repositories/databases

There are many open repositories and databases available; so, research faculty and scholars can deposit their research output in those databases.

Benefits of Google Scholar

There are many benefits of creating Google Scholar profile of Institutes which gives cumulative research index like number of citations, h-index, and i10-index of all faculties. It helps in institutional growth and future planning, to get and apply for funded research and grant, for students placement, collaborative research, industry collaboration and International recognition, also, Google

Scholar profile of an academic institution is useful. This profile is easily accessible to all faculties and public, but regular update is necessary.

Scope of departmental profile

Together with institutional, individual Google Scholar profile is a scope in which every department can create their own Google Scholar profile, and add all their departmental faculties research output. It gives the research index of that department, and help educational institute to check their research performance.

CONCLUSION

Indian higher educational institutes like universities and colleges are being criticized for several reasons for several years now, though they have improved their quality in all areas. Mainly, they are criticized for poor quality of syllabi, lack of skilled faculty members, lack of research interest in faculties, lack of seeking funds for small projects and research, lack of motivation to competent at international level, less number of citations and research output (Gupta, 2010; Prathap, 2014a, b). In India, there is less active participation in shared and collaborative research as compared to Western countries. All these comments and discussion are going on because Indian scholars and educational institutes do not showcase their research. If every educational institute in India is able to create such Google Scholar account for their research output, then, the research metric will be very high. It will help Indian Educational Institutes to get recognition in research areas as well.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

REFERENCES

- Gupta BM (2010). Ranking and performance of Indian universities based on publication and citation data. *Indian J. Sci. Technol.* 3(7):837-843.
- Hirsch JE (2005). An index to quantify an individual's scientific research output. *Proc. Natl. Acad. Sci. United States America* 102(46):16569-16572.

- Kothari CR, Garg G (2014). *Research methodology: methods and techniques*. 3rd Ed. New Age International Publishers, New Delhi. ISBN: 978-81-224-3623-5. pp01
- Maier D (2015). What is the meaning of citation in research papers? Accessed from <https://www.quora.com/What-is-the-meaning-of-citation-in-research-papers>
- Pathan SN (2005). Quality improvement programme in higher education through NAAC: a success story of Maharashtra. *Intellectual Book Bureau*. Bhopal. 2-5. pp. 127-128. ISBN: 81-88909-03-3.
- Prathap G (2014a). The performance of research-intensive higher educational institutions in India. *Curr. Sci.* 107(3):389-396
- Prathap G (2014b). The performance of research-intensive higher educational institutions in India *Current Science*, 107(3):389-396
- Stella A (2001). *Quality assessment in Indian higher education: issues of impact and future perspectives*. Allied Publishers Limited, Mumbai. ed.1st. 2001. P 22. ISBN: 81-7764-182-4.
- University Grant Commission (2017a). List of academic staff colleges. Accessed from <http://www.ugc.ac.in/page/Academic-Staff-Colleges.aspx>
- University Grant Commission (2017b). Status list of approved 613 Autonomous colleges as on 16.06.2017. Accessed from http://www.ugc.ac.in/oldpdf/colleges/autonomous_colleges-list.pdf
- University Grant Commission (2017c). Consolidated list of Central Universities as on 29.06.2017. Accessed from <http://www.ugc.ac.in/oldpdf/Consolidated%20list%20of%20Central%20Universities%20as%20on%2029.06.2017.pdf>
- University Grant Commission (2017d). Consolidated list of colleges under section 2(f)/12(B). Accessed from [http://ugc.ac.in/oldpdf/colleges/List of colleges as on 30.04.2017.pdf](http://ugc.ac.in/oldpdf/colleges/List%20of%20colleges%20as%20on%2030.04.2017.pdf)
- University Grant Commission (2017e). List of Institutions Deemed to be Universities included under 12(B) of the UGC Act, 1956. Accessed from http://www.ugc.ac.in/pdfnews/7675300_list-of-Deemed-University220617.pdf
- University Grant Commission (2017f). State University list. Accessed from http://www.ugc.ac.in/print_stateuniversity.aspx
- University Grant Commission (2017g). State-wise list of private universities as on 29.06.2017. Accessed from <http://www.ugc.ac.in/oldpdf/Private%20University/Consolidated%20List%20Private%20Universities%20as%20on%2029.06.2017.pdf>
- University Grant Commission (2017h). List of universities/colleges for Community Colleges. Accessed from http://www.ugc.ac.in/pdfnews/List_Community_Colleges.pdf

CITATIONS

- Author Impact Metrics. HLWiki International. Accessed from http://hlwiki.slais.ubc.ca/index.php/Author_impact_metrics
- Citations. Wikipedia. Accessed from <https://en.wikipedia.org/wiki/Citation>.
- Google Scholar Citations. Accessed from <https://scholar.google.co.in/intl/en/scholar/citations.html>
- Google Scholar Metrics. Accessed from <https://scholar.google.co.in/intl/en/scholar/metrics.html>
- The University of Auckland. Research Definition and Research Outputs: System Categorisation Guidelines. Accessed from <https://www.auckland.ac.nz/en/about/the-university/how-university-works/policy-and-administration/research/output-system-and-reports/research-outputs--definition-and-categories.html>