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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	1-20	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.

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

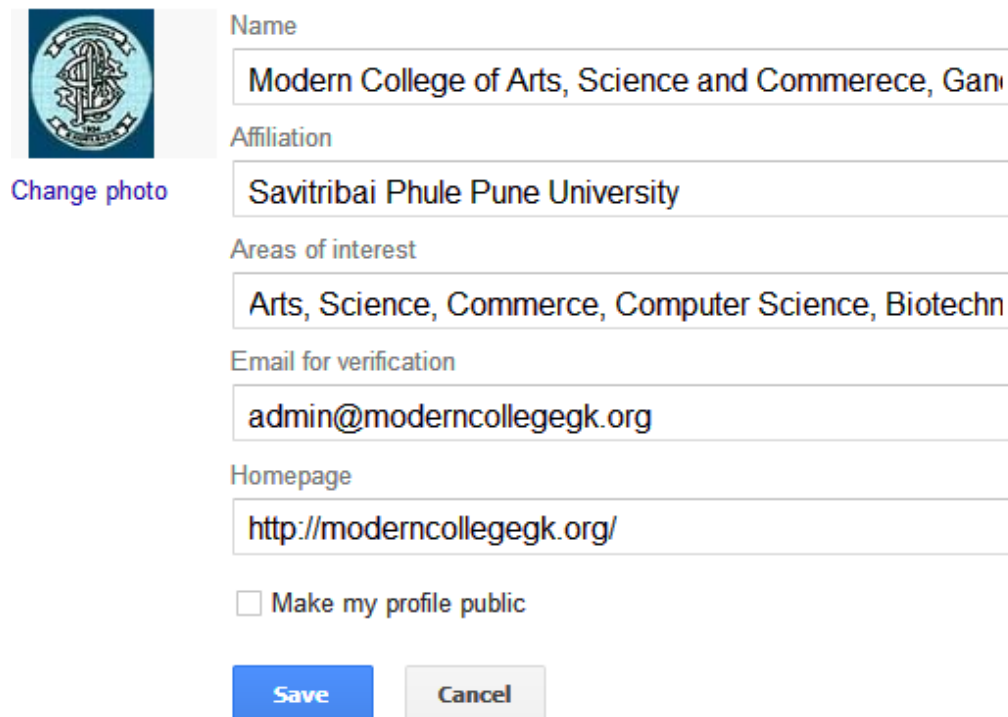
prepares list of publications as a compendium.


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

Affiliation

Areas of interest

Email for verification

Homepage

Make my profile public

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 Shriram - 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 list includes articles with checkboxes for selection. The selected articles are:

- 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
- 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
- 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

Other articles in the list include:

- Review of hydrometallurgical recovery of zinc from industrial wastes
MK Jha, V Kumar, RJ Singh - Resources, conservation and recycling, 2001
- 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
- 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.

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Full Length Research Paper

Utilization of library resources by lecturers in university of cape coast

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This research work was designed to examine the utilization of library resources by lecturers in University of Cape Coast. The objective of the study was to find out the level of availability of library materials in the university, and determine the extent of use of the materials by lecturers. It is also to find out factors that impede lecturer's use of the library and make recommendations for improvement. A descriptive survey was used for the study. In all, 200 lecturers were selected for the study. The lecturers were selected using random sampling. Statistical tools used for the analysis were frequency counts and mean scores. The major finding of the study is that there are many library resources such as textbooks, journals, research monographs, research reports, newspapers, indexes/abstracts, internet services and dictionaries/encyclopedias amongst others, and that lecturers use the library mainly for consultation of reference materials. They also use it for research purposes and borrowing of books. A major finding was also that lecturers utilized books more than any other source of information. A number of recommendations were put forward for improvement of library use but the most prominent suggestion was that more up to date and relevant materials should be acquired by the library, and lecturers should be informed of newly acquired materials.

Key words: Library resources, lecturers, university library.

INTRODUCTION

Lecturers need various kinds of information resources for teaching and research, for the purposes of impacting knowledge to students and self-development. For learning to take place, lecturers and learners must have access and use the necessary and adequate information resources.

Library resources contain information in both print and non-print formats such as textbooks, journals, indexes, newspapers and magazines, reports, internet, video

tapes, diskettes, and microforms. Library resources are the raw materials that provide vital services in the teaching and learning process.

Accessibility of library resources creates an enabling environment for the utilization of library resources. It is assumed that if information is accessible to the lecturers in university libraries, it could be used for effective teaching. The main goal of the university library is for users to gain access to its abundant wealth of information

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resources. Information sources are efficient if they provide relevant, useful and accurate information that can help users solve their problems. Accessibility of library resources means the ease of locating and retrieving a piece of information from the storage medium (Akobundu, 2008).

The role of the library therefore is to make available organized materials that will enable the institution to achieve its set objectives. Hence, the university library is the nerve centre, the central and primary place of the institutions academic activities. Nelson (2003) indicates the fact that a university library should be built with vision, ambition knowledge and dedication. Above all, the University of Cape Coast (UCC) library was built with the conditions governing the set-up of its institution that is to provide necessary information to lecturers, students and researchers and community services, without which the whole system will perhaps collapse.

The vision of UCC library is to have a university library that is strongly positioned to provide accurate, reliable, authentic and complete information in a timely manner to support academic activities. Also, its mission is to add value to the university's teaching, learning, research, publication and dissemination activities by providing excellent information services which make available and accessible information materials both in print and electronic formats to its clients (University of Cape Coast Library Strategic Plan 2013-2017).

Lecturers require quality information resources or materials in order to teach effectively; undertake innovative research and use their acquired knowledge and experience to provide expert services to the university in order to turn out professionals and qualified students who will be leaders of tomorrow. Therefore, libraries are expected to provide such resources which when used effectively by lectures, would translate into improved teaching effectiveness and quality products. Inability to access information resources in the library can result in time waste and frustration.

Information utilization is the practical and maximum use of library resources identified and acquired by a user for the purpose of solving a problem or achieving a set goal. The lecturers in universities are expected to use library resources for teaching. Effective lecturing could be achieved if library information resources are correctly utilized to lecturing functions by the lecturers, thus, resources are of no value to the lecturers until they have been utilized.

The university library is meant to serve the undergraduates, post-graduates, lecturers and other members of the university community. The quality of a university is measured largely by the quality of its library because of its unique role in the university system. There can never be the existence of a university without a

library since the university is meant to teach and carry out research.

However, it has been observed that students complain about the quality of lecture notes their lecturers give them. Some of the students also talk about the same format and content being repeated by lecturers over and over again. Is it because those lecturers do not have any means of getting information or do not get the needed resources in searching for information? With this concern, the researchers feel that only an investigation will unravel the mystery, whether the university library have the necessary resources to support lecturing and learning. Henceforth, it is hoped that once the problems are discovered and solutions found, lecturers will begin using the resources available them.

In the light of this therefore, the need for this study becomes very imperative. It has become expedient to ascertain the extent to which lecturers utilize resources in university libraries in promoting research, teaching and learning. It is against this backdrop that this study sets to find out the extent of utilization of library resources by lecturers in University of Cape Coast.

Research questions

This study aims to investigate the utilization of library resources by lecturers in University of Cape Coast. Specifically, the research will investigate into:

- (1) What is the level of availability of library materials in University of Cape Coast?
- (2) What is the purpose of the use of library resources by Lecturers in University of Cape Coast?
- (3) What is the extent of use of library resources by lecturers in University of Cape Coast?
- (4) What factors impede/hinder the use of library resources by lecturers in University of Cape Coast?

LITERATURE REVIEW

The importance of libraries to education generally lies in the fact that they provide necessary information to lecturers, students and researchers and community services. The significance of academic libraries lies in the fact that they are repositories of knowledge that provide the vital underpinning for national development. Earlier studies by Kannappanavar and Manjunatha (2010), and Majid et al. (2000) had observed that professional staffs from different disciplines in some Saudi universities visited their libraries often.

Popoola and Zaid (2008) undertook a study titled faculty awareness and use of library information products

and services in Nigerian Universities. The main purpose of the study was to find out if there is any significant difference in faculty member's awareness of library information products, and services, and also to determine the sources used by faculty members to inform themselves about available information products and services in the library. The study observed that, colleagues, personal experience, signs/notice in the library, library correspondence and librarians were the major sources used by the members to inform themselves about the availability of library information products and services in the studied universities.

Dickenson (2006) in an academic library impact study (ALIS), of academic library usage and outcomes, involving nine colleges and universities, indicated that faculty members use libraries, because of the resources they provide. Faculty members use libraries to fulfill a need, that fulfillment which would enable them perform their duties or achieve various set objectives, and goals. The survey also showed that, the majority of faculty members indicated that, at least some of the time, they included bibliographic instruction or information literacy sessions in their undergraduate courses. The majority of them also indicated that, they frequently or sometimes placed print materials on the traditional reserve services at their institution's library for their students, and also recommended print resources. Again, in the ALIS study, some faculty members said that they have frequently, or sometimes used electronic reserve services through their college or university library. The survey also revealed that, the majority of them search library catalogues other than their own, by utilizing links from their library's website.

Foster and Gibbons (2005) looking at how faculty interact with digital tools, and how they organize their work in physical and virtual work places, stated that, what faculty members and university researchers want was, to do their research, read and write about it, share it with others, and keep up in their fields. They continue that many faculty members are outstanding teachers, and some are skilled administrators.

In a survey conducted by Sharma (2009), to analyse the dependency of teachers and research scholars on e-resources, the perceived impact of the e-resources on their academic efficiency, and problems faced by them whilst using the e-resource, also identified e-resources to include journals, data archives, manuscripts, maps, books, magazines, theses, newspapers, e-mail, research reports, and bibliographic databases. The results showed that the use of e-resources was very common among teachers, and research scholars in India, and that the majority of the teachers, and research scholars were dependent on e-resources to get the desired and relevant information.

Electronic resources are now used more than print resources (Morse and Clintworth, 2000). Their advantages include access to information that might be restricted to the user due to geographical location or finance, access to more current information, and provision of extensive links to additional resources or related content (Dadzie, 2005). According to electronic information has gradually become a major resource in every university library in recent years, and this has led many to predict the extinction of the printed journal.

Some advances in information communication technologies (ICT), and scholarly use of information services, has changed how lecturers utilize library resources for research practices, and teaching methods. Housewright and Schonfeld (2010), however, observed that since 2000, faculty members have steadily been shifting towards reliance on network-level electronic resources, and a corresponding decline in interest in using locally provided tools for discovery of books, journals, and other materials. The study concluded that, while print journals may continue to play a limited role for faculty with specific needs that are otherwise poorly met, digital versions are clearly the medium of choice for most faculty members.

Madhusudhan (2008) in a study on Internet use, and the use of e-journals in the University of Delhi, indicated that 67.64% of the research scholars of the faculty of science, and 69.23% of research scholars of engineering use e-journals for research work. The studies also found out that, they used e-journals to study and, also to update their knowledge. Swain (2010) in a study of the use of e-services by faculty members of business schools in an Indian state also observed that faculty members preferred using e-articles over electronic theses and dissertations (ETDs). Some online databases like Emerald Management Xtra (EMX), EBSCO, and PROQUEST were fairly in use, while other online databases were not of high demand. The study observed that, the majority of faculty members were in favour of commercial e-services.

Theoretical framework

The theoretical framework for this study was the Theory of Human Attitude. The theory was developed by Allport and O'Connell (1958). The theory stipulates that attitudes are psychological "predispositions", because they predispose people to act in a certain way towards the object of the attitude. The attitude comes before behaviour and affects the way the person will act. The theory was deemed appropriate for the study because the use of libraries by lecturers is greatly affected by their perception of them. The knowledge component indicates that, the feelings

and actions of lecturers are based on their knowledge of a particular object or subject. What people know or perceive about a particular subject is very important because it affects how they behave or act towards it. The feelings and actions of lecturers towards the utilization of library resources would be evaluated based on their interests and availability of resources. Lecturers' knowledge on the importance of the library resources, purpose of library resources in their research and teaching processes would be evaluated to get an insight into what factors information play in their use or otherwise of these resources.

METHODOLOGY

The research method or design adopted for this study is the descriptive survey method. Descriptive survey method involves a study of a population through the use of sample. The findings obtained from studying the sample can be applied to the entire population (Nwana, 2001). The choice of this design was considered most appropriate because a large population is involved in the study. Descriptive survey method aimed at collecting data and describing in a systematic manner, the characteristics, features or facts about a given population.

The population of this study comprise of all lecturers in University of Cape Coast. The lecturer's population is put around 400. The lecturers were drawn from the College of Education (110), College of Agriculture and Natural Science (157), College of Health and Allied Sciences (37) and College of Humanities and Legal Studies (96). The College of Distance Education (CODE) is the fifth College in the University of Cape Coast. This College was not considered because most of their lecturers are not staff of UCC.

From a population of 400 lecturers, a sample size of 200 representing 50% of the population was determined as recommended by Nwana (2001), that if a population is in few hundreds, a 50% of the population could be determined as a sample size from a given population. Nwana (2001) recommendation is widely used by researchers. The lecturers were selected using random sampling. The stratified random sampling technique was used to ensure adequate representation from each College. Copies of questionnaire were administered to respondents at the circulation desk as they entered the library. The questionnaires were collected from them as they were leaving the library.

Questionnaire was administered by the researchers themselves and Statistical Product and Service Solutions (SPSS) version 21.0 was used for the analysis. The data gathered through questionnaire were presented in tables 1-4 while mean scores were used in the data analysis. A four point scale was used. The mid-point of 2.5 criterion mean is accepted as positive response. The formula for this is $\bar{x} = \frac{\sum X}{N}$

\bar{x} = mean

Σ = summation

X = raw score

N = number of observations

Any mean score that is above 2.5 is considered as positive and accepted. And any mean score below 2.5 is considered as negative and rejected. For the percentage 50% is regarded as positive and accepted while any below 50% is regarded as negative and not accepted.

DISCUSSIONS

The result of the study showed that 70 (35.0%) of the respondents were female while 130 (65.0%) were male, 20 (10.0%) of the respondents were professors, 105 (52.5%) were senior lecturers and 75 (37.5%) were Assistant lecturers. In terms of teaching experience, 56 (28.0%) and 75 (37.5%) of the lecturers have spent 1 to 5 years and 6 to 10 years respectively in teaching. Thirty-seven (18.5%) of the respondents have spent 11 to 15 years of teaching. The remaining 32 (16.0%) have taught well over 16 years. An inference from the above is that majority of the respondents have spent more than 5 years as lecturers.

Again, 16 (8.0%) and 37 (18.5%) fell in the 26 to 30 and 31 to 35 age brackets. Forty-four (22.0%) and 42 (21.0%) of them respectively fell in the 36 to 40 and 41 to 45 age brackets. Another 34 (17.0%) of them fell in the 46 to 50 age bracket while 11 (5.5%) of them fell in 51 to 55 age bracket. The remaining 27 (13.5%) fell in the 56 to 60 age bracket.

The results of this analysis shows that lecturers used for the study spread across all categories of age group, that is young, middle age and those preparing to retire from active teaching service. They therefore cater for all the age interest needed for this study.

Research question 1: What is the level of availability of library materials in University of Cape Coast?

The findings in Table 1 shows that out of the 13 library materials listed, With the exception of three, bulletin(s), biographies and periodicals which were rejected because they recorded a mean score below 2.5. However, the other ten library materials recorded a mean score of above 2.5 which were positively rated and accepted. Hence, for a university to serve all in society, its information sources must be diverse and varied in nature in order to serve the library clientele in general. All these are indication that relevant materials are available in UCC library.

Availability of library resources creates an enabling environment for the utilization of library resources and this will promote teaching and learning. This means that learning will take place because they have the available resources. The study support to work of Mbashir and Adeoti (2015) who found out that material in terms of books and journals were adequate for faculty staff in the study carried out in Kogi State University, Nigeria. This finding is in line with Emezi (2006) that a university library should endeavour to provide extensive materials (books and non-book materials alike) for study, teaching, learning and research for the benefit of the students and teaching and non-teaching staff of the university and others. However, this finding perhaps contradicts the

Table 1. Mean responses on the level of availability of library materials.

Library resources	AA	A	FA	NA	X	Decision
Journals	75	95	20	-	3.59	Accepted
Bulletin(s)	14	-	16	134	2.00	Rejected
Research monographs	96	54	20	-	3.48	Accepted
Research reports	111	50	15	-	3.47	Accepted
Indexes/abstracts	65	100	13	-	3.42	Accepted
Biographies	12	11	-	140	2.00	Rejected
Internet services	110	80	-	-	3.83	Accepted
Newspapers	120	65	10	-	3.62	Accepted
Atlases, maps and globes	90	60	9	-	3.40	Accepted
Encyclopedias/Dictionaries	140	50	-	-	3.61	Accepted
Textbooks	193	-	-	-	4.00	Accepted
Periodicals	-	-	-	153	0	Rejected
Gazettes (where applicable)	89	100	2	0	3.24	Accepted

Key: AA = Adequately Available, A = Available, FA = Fairly Available, NA = Not Available. The mean scores were interpreted as follows: Above 2.5 is considered as positive and accepted whilst 2.5 or below is considered as negative and rejected (Source: Field data, 2017).

Table 2. Mean responses on why lecturers use library resources.

Purpose	VA	A	FA	NA	X	Decision
To consult reference materials	180	-	-	-	3.85	Accepted
To prepare lecture notes	85	40	30	-	3.10	Accepted
To read newspapers	24	12	-	110	2.00	Rejected
To borrow books	65	52	38	-	3.20	Accepted
For research purposes	88	90	14	-	3.40	Accepted
To check for newly received materials	67	89	10	-	3.30	Accepted

Key = VA = Very Appropriate, A = Appropriate, FA = Fairly Appropriate, NA = Not Appropriate. The mean scores were interpreted as follows: Above 2.5 is considered as positive and accepted whilst 2.5 or below is considered as negative and rejected (Source: Field data, 2017).

studies of Haruna (2015) and Ijirigho (2014).

Research Question 2: What is the purpose of the use of library resources by lecturers in University of Cape Coast?

The data in Table 2 reveals that majority of the lecturers recorded a mean scores rate between 3.10 to 3.85, which were all considered positive and accepted. There was just one response which recorded a mean score rate below 2.5 and this was considered negative. This implies that all the lecturers in UCC consult the library resources to use reference materials, to prepare lecture notes, to borrow books and for research purposes except to read newspapers.

This is expected because books constitute the dominant information source available in the library and lecturers

need them to keep abreast with current happenings just as reference materials are used. This assertion further reinforced the reason that the resources at UCC library are fully utilized by lecturers. Information availability, accessibility, and use are essential to the teaching, research, and service activities of lectures.

This means that the library should embark on massive acquisition of more relevant materials (both print and non-print) so that's the collection could measure up with the University status. This is in agreement with Edoka (2000) who revealed that one of the fundamental functions of libraries in support of research, teaching and learning.

The findings also revealed that a number of lecturers go to the library to prepare lecture notes. This is quite expected since the library has books and materials that cover virtually all the topics taught by the lecturers. A

Table 3. Mean responses on the extent of use of library resources by lecturers.

Purpose	VHE	HE	ME	LE	X	Decision
Books	90	104	-	-	3.95	Accepted
Journals	35	40	30	15	2.90	Accepted
Newspapers	-	-	-	137	2.40	Rejected
Research monographs abstracts or indexes	65	52	38	-	3.20	Accepted
Research reports	88	90	14	-	3.40	Accepted
Electronic resources	67	89	10	-	3.30	Accepted

Key = VHE = Very High Extent, HE = High Extent, ME = Moderate Extent, LE = Low Extent. The mean scores were interpreted as follows: Above 2.5 is considered as positive and accepted whilst 2.5 or below is considered as negative and rejected (Source: Field data, 2017).

Tables 4. Mean responses on factors that hinder or impede the use of library material by lecturers in UCC.

Factors that impede/ Hinder	AH	H	PH	DH	X	Decision
Non-involvement of lecturers in book selection	94	39	22	9	3.44	Accepted
Few up to date materials	160	15	6	-	3.90	Accepted
Users not informed of new arrivals	93	87	8	-	3.20	Accepted
Inadequate instruction on library use	79	64	18	-	3.40	Accepted
Unavailability of automatic generator to power sockets	91	52	34	-	3.41	Accepted
Inadequate trained library staff	88	77	19	-	3.41	Accepted

Key = AH = Actually Hinders, H = Hinders, PH = Partially Hinder, DH = Do not Hinder. The mean scores were interpreted as follows: Above 2.5 is considered as positive and accepted whilst 2.5 or below is considered as negative and rejected (Source: Field data, 2017).

number of lecturers do not go to the library to read newspapers. The reading of the newspapers is meant to inform the lecturers with current happenings and information around the globe. This may be as a result of lecturers being able to purchase newspapers themselves or use their smartphones or tablets in accessing this service with ease.

Research question 3: What is the extent of use of library resources by lecturers in University of Cape Coast?

The data in Table 3 shows that all the library materials have a mean score of 2.90 and above except for newspapers which had a mean score of 2.40. This means the library materials are rated positively and accepted, implying that majority of the listed library material such as books, journals, research monographs, indexes, abstracts, research reports and electronic resources are being utilized to a large extent. Based on the findings as revealed by the study, majority of the lecturers said they used books more frequently than other information sources. One reason for this is that books are more in number than any other information source. A second reason is that the lecturers relied heavily on books

essentially for their lecturing responsibilities. The books contain the kind of information required for teaching and learning. This is in line with Awojobi (2004) who recommended that lecturers should make use of as many information sources as possible.

Research question 4: What factors hinder/impede the use of library resources by lecturers in University of Cape Coast?

The findings in Table 4 indicated that all the factors listed scored a mean score between 3.20 to 3.90 mean scores. By this, it means all the factors are rated positively and are accepted. They include non-involvement of lectures in book selection, few up to date materials, users not informed of new arrivals, poor library instruction, unavailability of automatic generator to power sockets, and inadequate library staff are factors that actually hinder or impede the use of library materials by lecturers. This is suggesting that the available materials at UCC library are not constantly updated and weed its outdated and non-useful collections. This means that the available information products and services at UCC library should endeavour to make personal contact with them and

provide useful information to them about the library and the materials available. The impediments to library use by lecturers confirms the works of Ochogwu (2007) who catalogued problems of library use by lecturers to include lack of funds to purchase current books, facilities, inadequate staff and lack of proactive librarians.

Conclusions

The results of the study showed that University of Cape Coast library have adequate library resources or materials for use by lecturers. It was also concluded that, the major purposes of lecturers using the library are for personal studies, research and checkout for new books. On the contrary, majority of lecturers do not go there to read newspapers, probably because they have laptops or tablets that have these access. Again, the study indicated that lecturers used more of books than other materials because of their high availability. The study also revealed few up to date materials, lecturers not involved in selection of books, users not informed of new arrivals and unavailability of automatic generator to power sockets as their major hindrance or impediments to use library materials.

RECOMMENDATIONS

- (1) Current or new editions and relevant materials particularly books should be acquired.
- (2) Lecturers should be regularly informed of newly acquired materials. This could be done by sending lists of current received publications to each Head/Dean of department or Provost of each College. Lecturers should equally be involved in the book selection policy of the university.
- (3) An automatic generator should be acquired for the library to be providing power in case of failure from the public supply to power sockets.
- (4) The university management should plan and develop strategies for effective and efficient use of Information and Communication Technology infrastructure for the utilization of library resources by lecturers to support academic study in UCC.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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