Online Visibility of the Intellectual Output of University of Education, Winneba Staff

Emmanuel Kutorglo¹, Jerry Addison Anyan² and Adolph Agbeh³

¹Webmaster, Publications Unit, University of Education, Winneba
   ekutorglo@uew.edu.gh

²Senior Assistant Registrar, Institute for Educational Development and Extension, University of Education, Winneba
   jaanyan@uew.edu.gh

³Ag. Deputy Librarian, University of Education, Winneba
   dagbeh@yahoo.com

Introduction
The University of Education, Winneba, (UEW) is a teacher education tertiary institution. It has the mandate ‘to produce professional educators to spearhead a new national vision of education aimed at redirecting Ghana’s effort along the path of rapid economic and social development.’ From this mandate, the University derived a vision ‘to be an internationally reputable institution for teacher education and research’; and a mission ‘to train competent professional teachers for all levels of education as well as conduct research, disseminate knowledge and contribute to educational policy and development’ (UEW corporate strategic plan 2004 – 2008).

Accordingly, senior members of staff of the University of Education, Winneba undertake research, in addition to their teaching/administrative duties. The Government of Ghana in line with this also pays staff of the University special book and research allowances to facilitate this endeavor. In an effort to make research more binding and also as the main focus of senior members of the University, promotions of both teaching and non teaching senior members/senior administrative and professional staff of the University have been tied to their research output. Teaching and non-teaching senior members are required to have a minimum of six (6) and five (5) researched papers respectively to be promoted to the next rank in their professional life.

In this study, we set out to determine how much of these intellectual output of senior members of UEW has been published on the Internet to project the University's online presence and image to current and potential students, alumni, supporters, and the public.
The Problem Statement
A major requirement for promotion of teaching and non-teaching senior members of UEW is to undertake research to support the mandate of the institution and to promote their work. In addition, teaching staff annually supervise the research works of undergraduate and postgraduate students which is a requirement for their graduation. The Vice-Chancellor of the University in his address to convocation at a special congregation to honour some distinguished sons of Africa on August 14, 2014 reported that the University had graduated over 100,000 students in its 20 years of existence. In effect, the collective research output from UEW could be reaching over 70,000 in 2014.

Ironically, very little is heard from staff of UEW during national debates on matters relating to education; either along quality, access, duration, gender, or inclusions in Ghana. In the academic arena, it is quite difficult getting research output of staff cited in the works of other scholars. Regrettably, a number of works done even at UEW appear to draw heavily on experiences of researchers from other institutions and countries. Hence, there is need to determine the volume of research undertaken by UEW staff and the proportion that is put online for global visibility.

Aim
The aim of this study was to contribute to the visibility drive of the University of Education, Winneba as captured in its corporate strategic plan 2009 – 2013.

Objectives of the Study
This study was set to determine:

- If there was enough documentary evidence that staff of the University of Education, Winneba actually did research work.
- How much of these intellectual output from the University of Education, Winneba was available on the Internet and contributed to the ranking of the institution.
- How much of the works of UEW staff were cited in the work of other academics

Relevance of the study
Universities worldwide are ranked and continue to be ranked per the intellectual output of their staff. Some ranking bodies do this through Internet searches, which reveal the work done by staff from these institutions that have been made available online. This study therefore, would help to establish the amount of intellectual output of UEW staff available to the world online since its inception and the contribution to the ranking of the institution.

Literature Review
The Essence of Research in Higher Educational Institutions
Many university faculty members engage in research, thereby contributing to the knowledge base of the discipline or academic field with which they are associated. In the 1915 "Declaration of Principles" formulated by a representative committee of faculty members including members of the American Association of University Professors (AAUP), the functions of colleges and universities were "to promote inquiry and advance the sum of human knowledge, to provide general instruction to the students, and to develop experts for various branches of the public service" (Joughin, pp. 163–164). As indicated, the mission of the University of Education, Winneba, among others, is to contribute to knowledge creation
at least in the field of education and to appropriately inform government and national policy in the field of education.

Research is commonly associated with conducting empirical studies, whether confirmatory or exploratory, but in some academic disciplines research also encompasses highly theoretical work. Emphasis is placed on faculty research role in large universities in part because large universities also run the majority of graduate programs and provide resources to support the pursuit of research agendas. Additionally, research-oriented faculty members often participate actively in generating internal and external monetary support to underwrite their laboratories or specific research projects. Faculty rewards are often based on the extent to which faculty members contribute to their disciplines through publishing articles and books, presenting research findings, staging performances and exhibitions, or disseminating their work to external audiences in other ways. Additionally, rewards may also be based on the faculty members’ success in securing funding from external public agencies or companies. At the University of Education, Winneba the case is not so different. Members of staff are required to further their work and justify their continuous stay with their research output. Evidence of projects undertaken by staff and the financial benefits such projects bring to the University also adds up to staff output for promotion.

**Significance of research output**

Students, professors, professional researchers and scientists in universities, research centres and the government conduct much social research which is not visible to the average person. The findings from research yield better-informed and less biased decisions for many organizations. (Neuman, 2003). At the University of Education, Winneba where teacher training is the main focus, research is carried out annually by staff and students to see if all is well with the Ghanaian educational system. Research on access, equity, performance and impart of education have been one over the years across the nation. The recommendations of these studies have given possible innovations that could further improve on lesson effects of some conditions on the educational system. In 2005 the work of Prof. Anamuah-Mensah Committee led to some major reforms in the Ghanaian Educational system.

Similar, investments made by Faculty and schools in research to create and disseminate knowledge benefits other industry, government and society. Often times, research findings are adopted into industry practice – for example, pricing models of commodity. For instance in 2004, the Government of Ghana was reported to have adopted Cocoa Pest and Disease Control (CODAPEC) and the Cocoa High Technology (Cocoa Hi-Tech) programmes, which aimed at increasing yields by application of technologies developed by Cocoa Research Institute of Ghana to boost cocoa production in the country (GNA, 2005).

**Institutional rankings**

Ranking of University websites has been developed around a central hypothesis that the university’s web presence reflects its global performance, the quality of its departments and services, the impact of its outputs and its international prestige.

The ranking, which is done by the ranking web ([www.webometrics.info](http://www.webometrics.info)) aims at promoting public dissemination of scientific knowledge in what is now termed the Open Access initiative. Currently, research-intensive institutions, like *Harvard University* and *Massachusetts Institute of Technology* are the best ranked, and often referred to as the world-
class universities. Web ranking is unrelated to the design of the websites or the number of visits they receive even though it is web size-dependent.

As a result the main factor in ranking of university sites is the evidence of what Isidro and Noelia\(^1\) termed the evidence of “academic digital divide”.

The evidence of academic digital divide is measured from web publications, including publications in Open Access repositories and digital networking initiatives in blogs, wikis etc.

**How institutions are ranked**
The Methodologies of Scimago Group and Webometrics rankings will be considered here. Webometrics uses the following indicators:

- Visibility of the institution
- Activity on their sites
- Number of research works
- Nature of the website (Appendix I)

The University of Education, Winneba since 2010 has been ranked. Until July 2014 the institution had placed as the third best site amount websites of higher education institutions in Ghana. In July 2014 however, the institution was not ranked due to the low number of publications available on it.

The institutions visibility, activity and nature have ranked quite well in all these rankings. However, it has lagged often in terms of research. An institution like the Kwame Nkrumah University of Science and Technology which over the same period has ranked quite better than the University of Education, Winneba has an active online repository that is updated quite often.

**Methodology**

**Population**
The population for this study was all Staff of the University of Education, Winneba. Purposive sampling was used to select all Senior Members in the University of Education, Winneba for the study. This was because, they are all required to undertake research and their promotions are tied to their intellectual output. Additionally, they benefit from research and or special book allowances from the Government of Ghana.

**Sample size**
Data collected from the Planning Unit of the University indicated that there were close to 500 senior members; made up of Teaching, Administrative and Support Staff spread across the campuses and distance study centres of University of Education, Winneba.

**Data collection**
Data was collected from two main sources namely Human Resource Division and the Publications Unit of the University for evidence of research output by staff. The Internet was also used to determine how much of the works were available to the world through the

---

\(^1\) Isidro F. Aguillo and Noelia Gutierrez Labajos on Ranking Web of World Universities.
Internet. The research and publications output of the University which is published annually by the University as part of the Vice-Chancellor’s annual report was studied for staff output. A count of the number of works published in the research index was made for the period.

The Human Resource Division was also contacted for the number of senior members promoted to various grades since the inception of the institution and also to verify if the requirement to have some publications to one’s credit before being promoted was being followed. An Internet search was performed on google scholar database to see how much work was available online. Google scholar regularly crawls institutional repositories for scholarly published works and makes same available to the academic community worldwide. UEW has a repository managed by the library and members of staff have been requested to make available their works for publication in the repository.

**Presentation of Results**

**Evidence of staff publications**

**Vice-Chancellor’s Annual Report**

Publications of staff reported in the research index of the Vice-Chancellor’s Annual Report were as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty of Agric. Education</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td>Faculty of Science &amp; Env. Edu.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Faculty of Business Education</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Faculty of Education &amp; Com. Science</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Faculty of Tech. &amp; Voc. Education</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Ajumako Campus</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>School of Creative Arts</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Faculty of Educational Studies</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Faculty of Languages Education</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>Faculty of Science Education</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td>Faculty of Social Science Education</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>School of Graduate Studies</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Institute for Edu. Develop. &amp; Exten</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>Other Offices</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>University Library</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Office of the Registrar</td>
<td>9</td>
<td>14</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Directorate of Workers &amp; Physical Development</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Counselling Centre</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>SACOST</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Externally Funded Projects Office</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Internal Audit Office</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
Human Resource Records on Promotion
The University of Education, Winneba has over the past ten years promoted over 200 senior members to different grades. Each presented a minimum of five (5) publications to be considered for the promotion. By extension, over one thousand (1000) publications were presented by staff officially as work they have been doing to further the calling of the institution.

Intellectual output retrieved online
A summary of search by names of individual senior members of the University of Education, Winneba was as follows:

Result of online search for staff publications
From the sample used, 12% of Senior Members were female and 88% male as shown below

<table>
<thead>
<tr>
<th>Senior Members Distribution by Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>female</td>
</tr>
<tr>
<td>12%</td>
</tr>
</tbody>
</table>

www.jeper.org
Kutorglo, Anyan and Agbeh
31% of Senior members were performing administrative or supporting roles while 69% were into teaching.

Out of the Senior Members of the University of Education, Winneba who were searched online, 83% had one or more intellectual work online whiles 17% had none of their intellectual output published online.

19% Senior Members in Administration and support services, 19% had no publications available online and 81% had one or more publications online.
84% of the teaching staff had their publications available online and 16% had none of their publications online.

For the females, 77% had their publications online and 23% had none of their intellectual output online.
71% of female senior members in administration and support services had their publications online and 29% had none of their works online.

80% of female senior members had their works online and 20% had none of their works available online.
For the male category, 85% of senior members who are male had their works available online and 15% had none of their works online.

84% of males in administration and support had their works online and 16% had none of their works available online.
For the teaching staff, 86% of males had their works online and 14% had none of their works available on the Internet.

Over 50% of senior members have above twenty (20) of their intellectual works available on the Internet.
Most publications, 49%, from Senior members retrieved online were in the areas of education.

Of the searches performed between 1 and 5 representing 1% of the intellectual output of staff were retrieved from the University of Education, Winneba institutional repository (ir.uew.edu.gh).
Discussion of Result/Findings
As evidenced from the Vice-Chancellor’s Annual report and records from the Division of Human Resource, senior members of the University of Education, Winneba have engaged in research as expected of them. A number of them have also earned their promotions per the records from the Division of Human Resources. Majority of works done by them is in the area of Education, which implied that they are contributing to the realization of the mission and vision of the institution and also living the mandate for which the institution was established to produce professional educators and conduct research to inform policy decisions bothering on education in Ghana.

Even though the study was not designed to test the outputs of the various categories of staff, the teaching staff seemed to have an urge with the number of publications over their counterparts in administration and support services in research output and its availability online. This trend was the same when looked at in terms of gender (male and female senior members).

One unique observation, however, was that though a lot of works of senior members of the University of Education, Winneba were available on the Internet, and only 1% of these were retrieved from the University of Education, Winneba institutional repository. By implication, the effort and intellectual output of senior members may not be contributing to its ranking. As noted, among other indicators, the total numbers of documents published in scholarly journals indexed in Scopus from open institutional repositories are used by Webometrics as a measure of output for ranking of institutions.

Conclusion and Recommendations
The advent of the Internet has brought a lot of change to the academic world; information is more widely available than ever before. Today, a lot of activities are carried out online with ease, and exposure is given to most business ventures, institutions and individuals, as well as results of empirical research, in order that people benefit from them. To further this course, the global Open Access Initiative was birthed to provide seamless access to scientific
publications via the Internet. Unfortunately, a good number of people in the academia are yet to be part of this initiative; as they prefer to maintain closed access to their works for various reasons, thus missing the global visibility that they were supposed to gain for having their works online.

The results of the above study indicate that the University of Education Winneba could have been doing better as far as online visibility of Staff publications is concerned. It is clear that Staff do not have big visibility, with regard to peer-reviewed works published in reputable journals. Online visibility of Staff through published works is one of the indices considered in the ranking of Universities, and since the University of Education Winneba did not get high ranking in the 2013/2014 academic year, it could be concluded that the not too vibrant online visibility of Staff could have affected the University’s ranking.

Recommendations
Following from the findings of the above study, the following issues are being recommended:

- Patronage of the University’s Institutional Repository (IR) must be seriously encouraged. Its benefits, among other issues, are to ensure the long-term preservation of an institution’s academic output; to increase its visibility and prestige, and act as an advertisement to attract funding sources, potential new faculty and students. When Staff have their articles and other scholarly works uploaded on the IR, it would afford them global visibility, since the IR is fully online.

- The concept of Open Access has to be brought home strongly to all Staff. Everybody needs to understand that Open access (OA) is the free, immediate and permanent online availability of the full texts of research and academic documents in digital form (Budapest Open Access Initiative, http://www.soros.org/openaccess/read.shtml). Rodríguez-Armentia, N; Amat, CB (2010). The OA principle has been in place since the early 1990s and based on the confluence of several motivations and initiatives. It would, for example, be necessary to point out that OA maximises the visibility, usage and impact of the research papers freely available. This could encourage authors to be less reluctant to have their works put online.

- In line with the OA concept therefore, Staff should be made aware of the possibility of self-archiving; which is usually labeled the “green road”, in line with the Budapest Initiative of Open Access. This would enable them to put their works online, without having to rely on publishers to grant them access to their journals, a path referred to as the “gold road”.

- For any or all of the above to materialize, the necessary workshops have to be organized for Staff to be well-acquainted with these concepts, to understand all copyright and other policy issues related to online visibility and the benefits therein.

References


UEW corporate strategic plan 2004 – 2008
UEW corporate strategic plan 2008 – 2013
Vice-Chancellor’s Report to Convocation, August 14, 2014

Appendix 1

Visibility (50%)

- **IMPACT.** The quality of the contents is evaluated through a "virtual referendum", counting all the external inlinks that the University webdomain receives from third parties. Those links are recognizing the institutional prestige, the academic performance, the value of the information, and the usefulness of the services as introduced in the webpages according to the criteria of millions of web editors from all over the world. The link visibility data is collected from two important providers of this information: Majestic SEO and ahrefs. Both use their own crawlers, generating different databases that are used jointly for filling gaps or correcting mistakes. The indicator is the product of square root of the number of backlinks and the number of domains originating those backlinks, (so it is not only important the link popularity but even more the link diversity.) Not clear! The maximum of the normalized results is the impact indicator.

Activity (50%)

- **PRESENCE** (1/3). This is the total number of webpages hosted in the main webdomain (including all the subdomains and directories) of the university as indexed by the largest commercial search engine (Google). It counts every webpage, including all the formats recognized individually by Google, both static and dynamic pages and other rich files. It is not possible to have a strong presence without the contribution of everybody in the organization as the top contenders are already able to publish millions of webpages.

- **OPENNESS** (1/3). This is linked to the global effort to set up institutional research repositories and takes into account the number of rich files (pdf, doc, docx, ppt) published in dedicated websites according to the academic search engine Google Scholar. Both the total file records and those with correctly formed file names are considered (for example, the Adobe Acrobat files should end with the suffix .pdf). The objective is to consider recent publications that are available in the institutions within a two year period.

- **EXCELLENCE** (1/3). The academic papers published in high impact international journals are playing a very important role in the ranking of Universities. Using simply the total number of papers can be misleading, so we are restricting the indicator to only those excellent publications, i.e. the university scientific output being part of the 10% most cited papers in their respective scientific fields. (Although this is a measure of high quality output of research institutions, the data provider Scimago group and Google Scholar.) Not clear!
Scimago on the other hand have their indicators divided into three groups intended to reflect scientific, economic and social characteristics of institutions. The SIR includes both size-dependent and size-independent indicators; that is indicators influenced and not influenced by the size of the institutions. In this manner, the SIR provides overall statistics of the scientific publication and other output of institutions, at the same time, that enable comparison between institutions of different sizes.

**Research**

- **Output**: Total number of documents published in scholarly journals indexed in Scopus (Romo-Fernández, et al., 2011). This is a size-dependent indicator.

- **International Collaboration**: Institution's output ratio produced in collaboration with foreign institutions. The values are computed by analyzing an institution's output whose affiliations include more than one country’s address (Guerrero-Bote, Olmeda-Gómez and Moya-Anegón, 2013; Lancho-Barrantes, Guerrero-Bote and Moya-Anegón, 2013; Lancho-Barrantes, et al., 2013; Chinchilla-Rodríguez, et al., 2012). This is a size-independent indicator.

- **Normalized Impact**: Normalized Impact of led output is computed using the methodology established by the Karolinska Institutet in Sweden where it is named "Item oriented field normalized citation score average". The normalization of the citation values is done on an individual article level. The values (in decimal numbers) show the relationship between an institution's average scientific impact and the world average set to a score of 1, --i.e. a NI score of 0.8 means the institution is cited 20% below world average and 1.3 means the institution is cited 30% above average (Rehn and Kronman, 2008; González-Pereira, Guerrero-Bote and Moya-Anegón, 2011). This is a size-independent indicator.

- **High Quality Publications**: Ratio of publications that an institution publishes in the most influential scholarly journals of the world, those ranked in the first quartile (25%) in their categories as ordered by SCImago Journal Rank (SJR II) indicator (Miguel, Chinchilla-Rodríguez and Moya-Anegón, 2011). This is a size-independent indicator.

- **Specialization Index**: The Specialization Index indicates the extent of thematic concentration /dispersion of an institution’s scientific output. Values range between 0 and 1, indicating generalist vs. specialized institutions respectively. This indicator is computed according to the Gini Index used in Economy (Moed, et. al., 2011; López-Illescas, Moya-Anegón and Moed, 2011; Arencibia-Jorge et al., 2012). In this indicator, when the value is 0 it means that the data are not sufficient to calculate. However, it should be noted that although the resulting specialization values range between 0 and 1, these values have been normalized on a scale of 0 to 100 as the rest of the indicators. This indicator is size-independent.

- **Excellence Rate**: Excellence rate indicates the amount (in %) of an institution’s scientific output that is included into the set of the 10% of the most cited papers in their respective scientific fields. It is a measure of high quality output of research institutions (SCImago Lab, 2011; Bornmann, Moya-Anegón and Leydesdorff, 2012; Guerrero-Bote and Moya-Anegón, 2012). This is a size-independent indicator.

- **Scientific Leadership**: Leadership indicates the percentage of an institution’s output as main contributor, that is, the amount of papers in which the corresponding author
belongs to the institution (Moya-Anegón, 2012; Moya-Anegón et. al, 2013; Moya-Anegón, et al.). This is a size-independent indicator.

- **Excellence with Leadership**: Excellence with Leadership indicates the amount of documents in the Excellence rate in which the institution is the main contributor (Moya-Anegón, et al., 2013). This is a size-independent indicator.

- **Scientific talent pool**: Total number of authors from an institution in the total publication output of that institution during a particular period of time. This indicator is size-dependent.

- **Innovation**

- **Innovative Knowledge**: Scientific publication output from an institution cited in patents. Based on PATSTAT (http://www.epo.org). This indicator is size-dependent.

- **Technological Impact**: Percentage of the scientific publication output cited in patents. 100% = output in areas cited in patents (Agricultural and Biological Sciences; Biochemistry, Genetics and Molecular Biology; Chemical Engineering; Chemistry; Computer Science; Earth and Planetary Sciences; Energy; Engineering; Environmental Science; Health Professions; Immunology and Microbiology; Materials Science; Mathematics; Medicine; Multidisciplinary; Neuroscience; Nursing; Pharmacology, Toxicology and Pharmaceutics; Physics and Astronomy; Social Sciences; Veterinary). Based on PATSTAT (http://www.epo.org). This indicator is size-independent

**Web**

- **Web size**: Number of pages associated to the institution URL according to Google (https://www.google.com). This indicator is size-dependent.

- **Domain’s inbound links**: Number of incoming links to an institution domain according to ahrefs (https://ahrefs.com). This indicator is size-dependent.