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What do Agricultural and Biological Science Students Use? A Bibliometric Analysis of Undergraduate Research Projects

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What do Agricultural and Biological Science Students Use? A Bibliometric Analysis of Undergraduate Research Projects

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Abstract

The study investigate the citation pattern of undergraduate projects in a private university, Nigeria. Bibliometric method was adopted for the study to analyze the information sources cited in the research projects. The coverage of the study was from 2015 to 2018 set of graduates. Findings revealed that Animal Science programme accounted for the highest citations, while Agricultural Economics had the lowest citations. It was also discovered that an average of 49 citations per project were recorded. Journal articles and books were the most cited materials. The paper concluded and made recommendations.

Keywords: Bibliometric Analysis, Information Sources, Agricultural Science, Biological Science, University Students, Landmark University.

Introduction

The interrelatedness of scientific writings necessitates references to sources. No literature that is worthwhile can maintain isolation from previous writings as the knowledge of the past is usually 'mined' to develop new ones. Most especially in primary scientific communications, it is expedient to cite past researches from several scholars to confirm or contrast research findings. Yusuf and Owolabi (2017) however noted that undergraduate students who have not been fully ingrained into the core of research might find citing and referencing as a new terrain as it was not required to cite sources in their tests and examinations. This statement is one of the bases for carrying out the citation analysis of undergraduate projects in Landmark University. Rubin (2010) noted that citation analysis

points out the frequency of citation of certain works and the adopted pattern of citation. Citation analysis is a bibliometric tool meant foe evaluating resources cited in a specific or group of works (Gupta and Khare 2013). Bibliometrics is usually engaged to quantitatively appraise the format of publications and authorship using statistical and mathematical computation (Nkiko and Adetoro 2007).

It is important to constantly appraise sources, frequency, recency and other important elements that could be used to describe publications as these will guide supervisors, librarians and other stakeholders in research activities to make informed decisions on research issues relating to undergraduates. This becomes paramount with understanding that undergraduates are assumed to be new to the research culture. It is also a way of ensuring that ethical practice is ensured in research. This concern as raised in their findings, prompted Iroaganachi, Itsekor and Osinulu (2014) to recommend that faculty need to ensure that spurious authors are not included in citation and that recent works should be cited more in students' projects.

Citation analysis is very important for some specific functions. Some of them according to Grochowski (2014) include: establishing the impact of a specific work based on the frequency of reference made to it by other authors; determining an author's impact in his field of study considering how widely such has been cited; and finding out quality of sources where an author's work has been published. Assessment of undergraduate students' citation habits could also be done through citation analysis (Knight-Davis and Sung 2008).

Objective of the Study

The general objective of the study is to investigate bibliometric analysis of research projects submitted to the departments of Agricultural and Biological Sciences in Landmark University, Nigeria. The specific objectives are to:

1. To find out the total citation counts per programme in the Agricultural and Biological Sciences
2. To ascertain the average citation per programme in the Agricultural and Biological Sciences
3. To ascertain the sources of cited materials by students in the Agricultural and Biological Sciences
4. To find out the information sources mostly cited by the students
5. To know the recency of sources cited by students in the Agricultural and Biological Sciences Programmes

Literature Review

The focus of citation analysis revolves around the quality, quantity and impact of the publication being cited. The impact and quality of the author is also being analyzed through citation analysis evaluating how frequent a work is being cited (Fordham University Libraries 2018). Citation of books was found to be predominant in a study carried out by Nkiko and Adetoro (2007) among Covenant University undergraduate students. Projects submitted from 2001 to 2006 were the focus of the study. It could be inferred from this discovery that undergraduates may not be so familiar with journals which are the primary sources of information.

The need for information literacy therefore comes to the fore. Information literacy enables persons to easily find, evaluate, and effectively use the right information (Mitchell, Perkins and Bodey 2013). Retrieving information ethically is also needed for quality research (Gathoni, Gikandi, Ratnaya, Njoroge, Wasike, Kiilu, and Kabugu 2011; Ilo, Idiegbeyan-ose, Adebayo and Osinulu 2015; Idiegbeyan-ose, Nkiko, and Osinulu 2016). The role of

library in training undergraduates on information retrieval, use and citation is a very important user education service that libraries need to give priority.

A comparative study was carried out by Cooke and Rosenthal (2011) on students that have been exposed to training by libraries and those that have not. It was found that undergraduates that have received library training outperformed those that have not, in terms of citing sources consulted by them. An investigation of the citation habits of undergraduates that received face-to-face and online instructions was investigated by Clark (2010). First year students were found by Wilkes and Gurney (2009) to have preference for finding information through Google instead of electronic and print journals. A study by Mohler (2005) however found that undergraduates were able to reduce their use of web resources and focused more on books because they were mandated to do limit citation of web sources citation to only two.

Methodology

Bibliometric method was adopted for the study to analyze the information sources cited in the degree research projects submitted by the final year students in various programmes of Agricultural and Biological Sciences of Landmark University, Omu-Aran, Kwara State. There are 5 programmes offered in Agricultural Sciences, while Biological Sciences has 2 programmes. The coverage of the study is from 2015 to 2018 set of graduates from these programmes. Assessment of references in the projects submitted to the two Colleges was done with focus on identifying the citation counts, recency, sources and average citation per project by each student. MS Excel Sheet was used to code and analyse the data.

Data Presentation and Discussion of Findings

Table 1 showed the total number of research projects submitted by graduating students in each of the Agricultural and Biological Science related programmes offered by the

University. In 2015, 185 research projects were submitted, while 102 and 100 were submitted in 2016 and 2017 respectively. Only 42 research projects were submitted by the graduating students in 2018 across all the selected programmes. Animal Science programme had the highest number of submission (97) across the programmes and years in focus. Crop/Soil Science and Microbiology programmes ranked 2nd and 3rd with 85 and 84 submissions respectively, while Agricultural Economics had the least submission (29). Observably, there is a consistent reduction in the enrolment into agricultural and biological science related programmes which brought about the declining pattern of the research projects submitted.

Table 1: Submitted Research Projects by Programme from 2015 to 2018

Programme	**Research Project Submitted in 2015**	**Research Project Submitted in 2016**	**Research Project Submitted in 2017**	**Research Project Submitted in 2018**	**Total Submissions**	**Ranking**
Agricultural Economics	7	6	12	4	29	6
Agricultural Extension & Rural Development	45	18	12	4	79	4
Animal Science	58	19	16	4	97	1
Biochemistry	13	14	15	13	55	5
Crop/Soil Science	36	22	26	1	85	2
Microbiology	26	23	19	16	84	3
Total	**185**	**102**	**100**	**42**	**429**	

Table 2 indicated that Animal Science programme which accounted for 31.4% of the total citations has the highest citations (6,538 citations). Agricultural Economics had the lowest citation (1,394 citations). This is sufficiently explained by the number of students who graduated from these programmes.

Table 2: Citation Counts by Programme

Programme	Citation Count	Percentage	Rank
Agricultural Economics	1,394	6.7%	6
Agricultural Extension & Rural Development	3,562	17.1%	3
Animal Science	6,538	31.4%	1
Biochemistry	2,046	9.8%	5
Crop/Soil Science	3,071	14.8%	4
Microbiology	4,204	20.2%	2
Total	**20,815**	**100%**	

A total of 20,815 citations with an average of 49 citations per project were recorded following the analysis of 429 research projects. Table 3 which presents the total and average citation counts for each of the six programmes showed that Animal Science has the highest average score of citation per research project with 67 citations. This was followed by Microbiology and Agricultural Economics with 50 and 48 average Citations respectively. Agricultural Extension and Rural Development records 3,562 with average of 45 citations for an individual research project while Biochemistry records 2,046 citation with average of 37 individual citation and Crop/Soil Science has the least average citation of 36 citations for individual project.

Table 3: Average Citation Counts per Programme

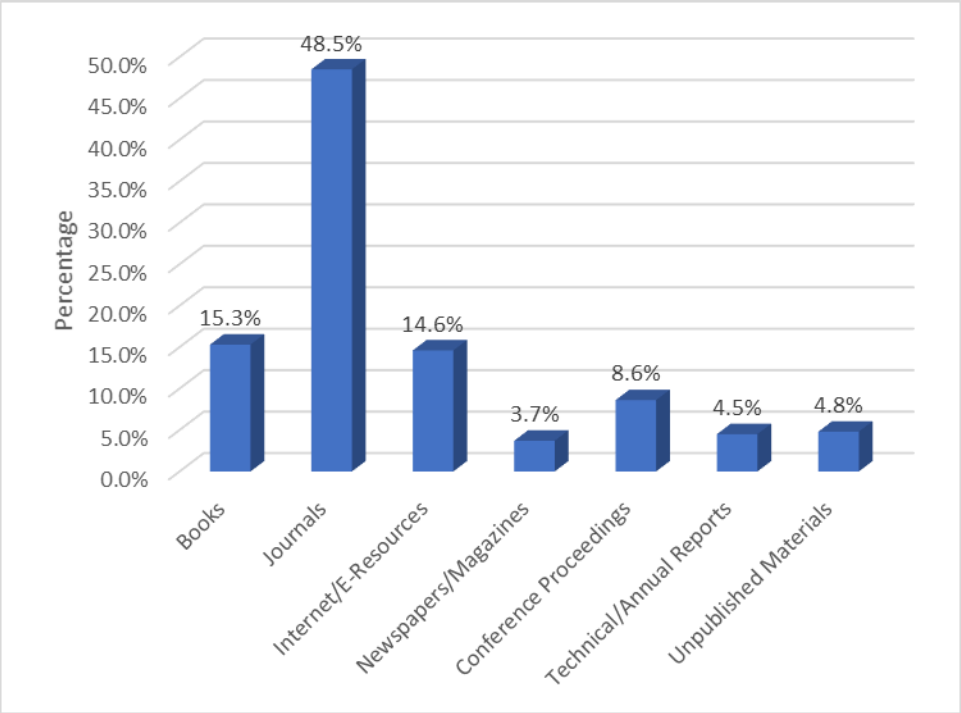
Programme	Total Citation Count	Average Citation Counts
Agricultural Economics	1,394	48
Agricultural Extension & Rural Development	3,562	45
Animal Science	6,538	67
Biochemistry	2,046	37
Crop/Soil Science	3,071	36
Microbiology	4,204	50

Table 4 and Figure 1 showed types of materials cited and the level at which they were cited. Most of the materials cited are journals with 10,105 citation counts representing 48.5% of the total cited materials. This study showed that there is a wide difference between total number of journals cited and any other cited materials including books. This wide margin contradicts the finding of similar study conducted by Iroaganachi, Itsekor and Osinulu (2014) which reported that social science students cited more books (69.4%) than all other materials in their research projects. This is followed by books (15.3%), Internet/E-Resources (14.6%) and Conference Proceedings (8.6%). Newspapers/Magazines were the least cited materials representing 3.7%. The low citation recorded by Newspapers/Magazines is expected as the contents of newspapers/magazines are largely subjective individuals' opinions and are mostly not peer reviewed. Furthermore, the low number of Internet/E-Resources cited which is not expected especially among those who are considered to be digital natives and in a University that provides uninterrupted access to huge online resources and the Internet could be linked with deficiency in information literacy skills of the students. It could also be inadequate knowledge of proper citation or acknowledgement of electronic resources and other web-based materials.

Table 4: Types of Cited Materials

Sources of Citation	Citation Counts	Percentage	Ranking
Books	3,194	15.3%	2
Journals	10,105	48.5%	1
Internet/E-Resources	3,033	14.6%	3
Newspapers/Magazines	763	3.7%	7
Conference Proceedings	1,792	8.6%	4
Technical/Annual Reports	938	4.5%	6
Unpublished Materials	990	4.8%	5
Total	**20,815**	**100%**	

Figure 1: Types of Cited Materials



In table 5, citations that fall within 2017 and above were classified as *Very Highly Recent*, 2013-2016 *Very Recent*, 2009-2012 R*ecent*, 2005-2008 *Not Very Recent*, 2001-2004 *Not Recent*, while 2000 and below were considered outdated. Table 5 showed that only 80 (0.4%) of the total citations were Very Highly Recent, 2,822 (13.6%) as Very Recent, 3,907 (18.8%) Recent, 3,825 (18.4%) Not Very Recent, 3,954 (19.0%) Not Recent, while the

largest number, 6,227 (29.9%) were outdated. Even though one of the major assessments of a good research is the recency of the materials cited, this study revealed that there is poor citation of recent materials among the students. It is expected that researchers will cite more recent materials.

Table 5: Recency of Citation

Year	Recency	Citation Count	Percentage	Ranking
2017 & above	Very highly recent	80	0.4%	6
2013-2016	Very Recent	2,822	13.6%	5
2009-2012	Recent	3,907	18.8%	3
2005-2008	Not very recent	3,825	18.4%	4
2001-2004	Not recent	3,954	19.0%	2
2000 & below	Outdated	6,227	29.9%	1
Total		**20,815**	**100**	

Conclusion

The essence of citation analysis cannot be over emphasized, It is important to constantly appraise sources, frequency, recency and other important elements that could be used to describe publications as these will guide supervisors, librarians and other stakeholders in research activities to make informed decisions on research issues relating to undergraduates.

Recommendations

1. The university library should continue in the annual acquisition of books, this practice is encouraged and should be sustained
2. The practice of annual subscription to E-Resources by the university library should be sustained, these resources are relevant information sources for research purpose.

3. The various departments and the university library should intensifier effort on educating the students on the need to cite more relevant materials in the research project.
4. The decline in the number of research projects submitted by the department of Agricultural Economic which is occasioned by the decline in the students' enrollment in the department should be addressed. There is need for the university management and the federal, state/ local ministries of education to increase enlightenment campaign on the importance of agriculture to national development and the realization of the sustainable development goals (SDGs)

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