

Research on Open Educational Resources (OER): A Bibliometric Analysis

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Abstract: *Research in the area of OER has proliferated significantly in the past few years. The purpose of the study is to analyse the scientific publications on open educational resources. The data for this study were collected from the Scopus database for the period 2011-2020. The tools such as Bibliometrix, Biblioshiny and MS- Excel were used to analyse the data and obtain significant results. The study revealed the top countries, authors and publication sources. the most relevant author keywords and publication source were also identified through this study. This bibliometric study can lead to strengthen the scientific productivity, research collaboration and understanding the research trend in the area of open educational resources.*

Key Words: *Open Educational Resources, OER, Open Education, Bibliometric Analysis, Bibliometrics, Biblioshiny*

1. INTRODUCTION:

At present, the demand for Open Educational Resources (OER) is expanding exponentially to meet the challenges of open education and blended learning. Many institutions may be private or government at both national and international level are involved in design and development of OER for their academic community. Many researches are going on to increase the discovery, availability, use and reuse of OER in an economically viable and sustainable manner. Scientists and researchers in their respective domain are exploring possible solutions for various challenges and issues related to OER and its legality.

The concept of OER has been defined by many sources in different manner. According to Wikipedia these are “digital materials that can be re-used for teaching, learning, research and more, made available free through open licenses, which allow uses of the materials that would not be easily permitted under copyright alone”. Unesco has defined it as “Teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions”. OERs are part of rising open practice in higher education and their potential uses have significant impact on students of higher education (Appiah, Essel, & Amankwa, 2020).

Bibliometric analysis of OER publications will help in identifying the research gap and the current trend of research. The data for applying various bibliometric technique are usually collected from citation databases like Scopus and web of Science (WoS). Nowadays, statistical packages like R-studio are being loaded with many bibliometric tools to facilitate the calculation and analysis of bibliometric data such as production count, citation count and keyword frequency.

2. OBJECTIVES

The purpose of the study is to analyse the scientific publications on open educational resources by applying various techniques of bibliometrics. The specific objectives are as follows.

- To observe the growth of scientific publications on OER
- To evaluate country wise publication production and collaboration
- To assess author’s productivity and citation pattern of publications
- To identify top publication sources and most relevant keywords
- To examine the source dynamics and word dynamics of publications

3. METHODOLOGY

This study analyses the research publications related to ‘Open Educational Resources (OER). The publications were retrieved from the Scopus citation database for the period of 10 years (2011-2020). The search strategy used to retrieve the relevant publications is as follows.

TITLE-ABS-KEY ("Open Educational Resources") AND PUBYEAR > 2010 AND PUBYEAR < 2021 AND (EXCLUDE (PUBSTAGE , "aip")) AND (LIMIT-TO (LANGUAGE , "English"))

The search result yielded a total of 1557 records, which was exported in BibTex format for further analysis. Each record was observed carefully to check the relevance of the publications with the search term. The present study used the R-Software in combination with other analytical tools such as Bibliometrix, Biblioshiny and MS- Excel to statistically analyse the collected publication data as per the predefined objectives.

4. ANALYSIS AND RESULTS

4.1. Dataset Sketch

The details of the complete dataset, calculated through the analysis tool are presented in form of a summary in the following table (Table-1). It shows that all the 1557 publications are from 656 sources. Out of the 3515 authors only 9% (307) publishes without any collaboration as single authors. The average citation per document is 5.89 and the author collaboration index is 2.73.

Table 1: Summary of the complete Dataset

Time Period	2011 - 2020
Sources (Journals, Books, etc)	656
Publications	1557
Average citations per documents	5.89
References	42795
Authors	3515
Authors of single-authored publications	307
Authors of multi-authored publications	3208
Single-authored publications	383
Documents per Author	0.443
Authors per Publication	2.26
Co-Authors per publication	3.11
Collaboration Index	2.73
Keywords	3347
Author's Keywords	3158

The Figure 1 shows that the major part of the publication includes Articles 47% (734) followed by Conference papers 37% (584) then Book chapters 9% (139). All other types of publications such as review papers, editorial and books are below 3%.

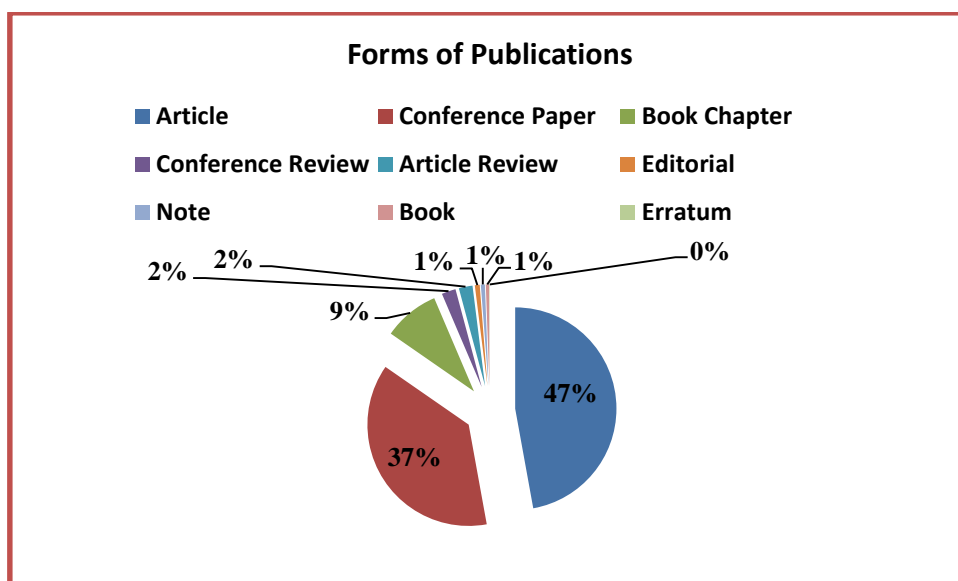


Fig. 1: Percentile distribution of publications by different forms of publication

4.2. Annual growth of publications

The year-wise distribution of publications in Figure-2 depicts that there is an increasing trend in the growth of publication from 2011 (81) to 2020 (282) with an average annual growth rate of 14.87%.



Fig. 2: Annual growth of publications

4.3. Country based Scientific Production

The worldwide distribution of publication has been presented in Figure-3 through a Map chart diagram. It was found that researchers from United States of America (USA) have published highest number of research papers (584) followed by Spain (263) and then United Kingdom (UK) (245). The position of India is in 10th rank with 72 publications.

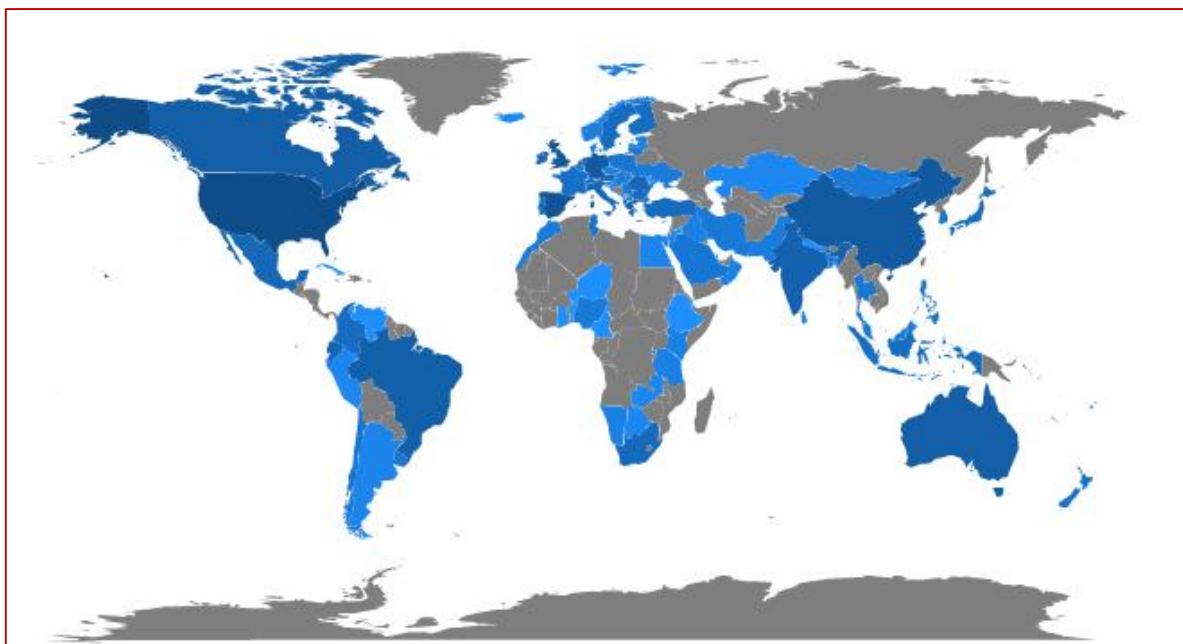


Fig. 3: Map chart for contribution of publications by different countries

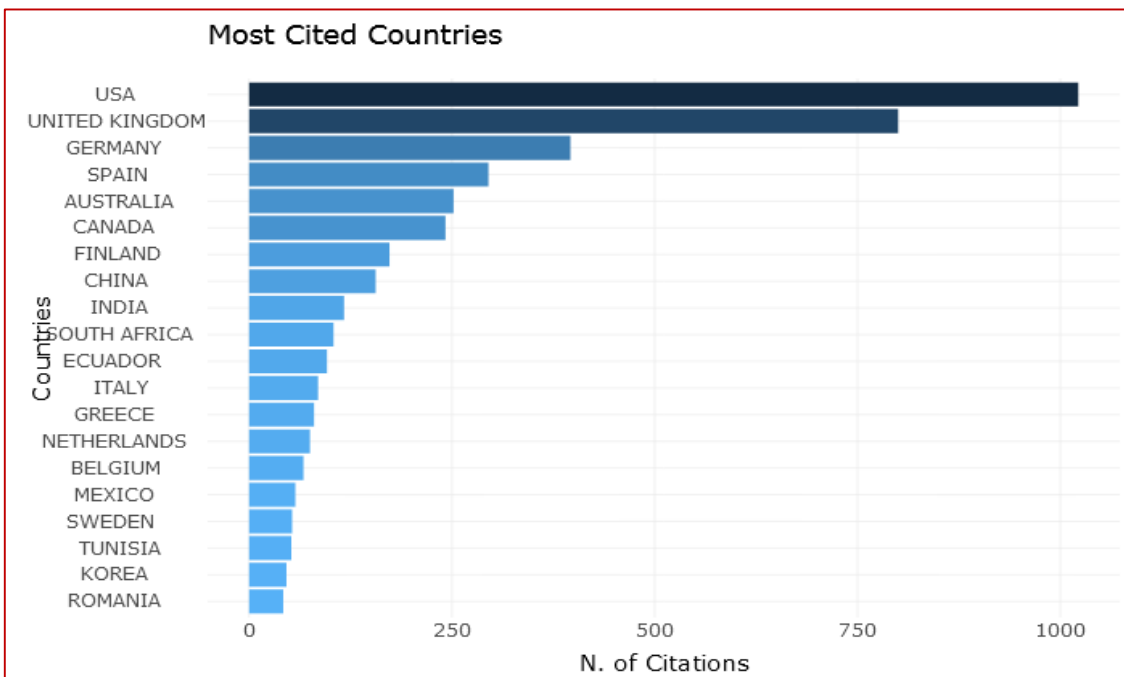


Fig. 4: Distribution of citations by different countries

Figure- 4 shows that the most cited country is USA with 1022 citations followed by UK with 800 citations then Germany 396 citations. India occupies 9th position with 117 citations.

The research collaboration between different countries is presented through a country collaboration map in Figure-5. It was found that Spain has the highest frequency of collaboration with many countries such as Ecuador (42), UK (19), USA (8), and China (7). USA has collaborated more with China (17) and Canada (14). UK has highest collaboration with Italy (8). Germany has collaborated with UK (13) and Finland (13). Greece has more collaboration with Finland (9), Germany (9) and UK (7).

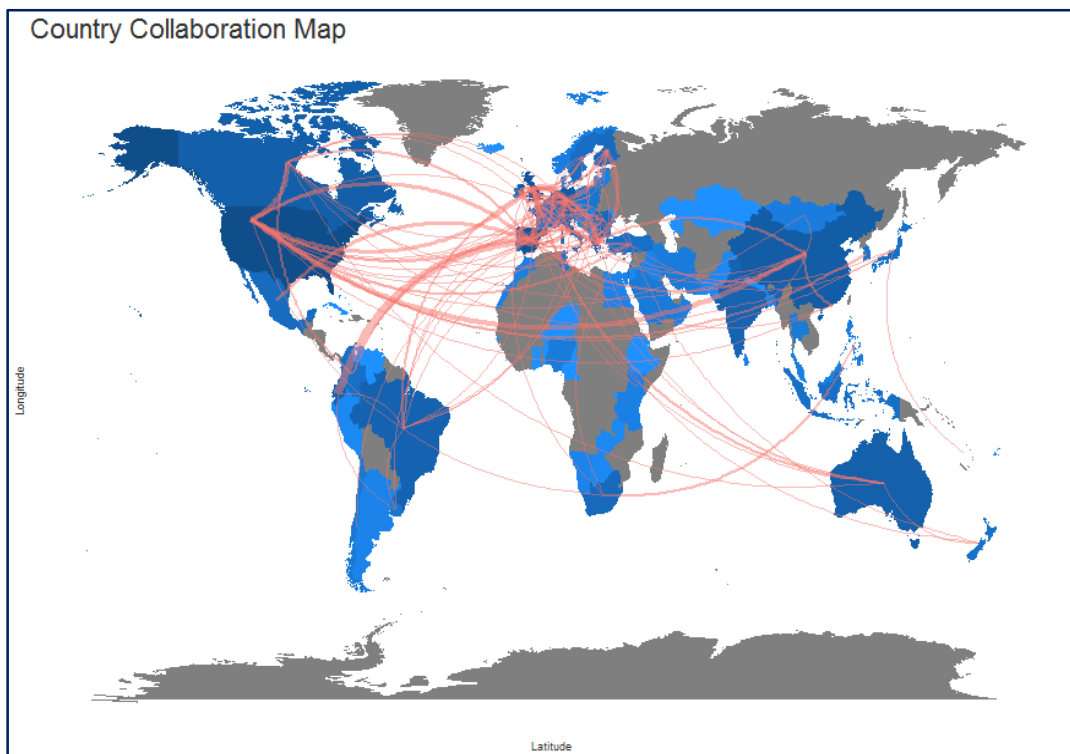


Fig. 5: Research collaboration between different countries

4.4. Publication Source based scientific production

It was found that the highest numbers of publications are from the publication source ‘International review of research in open and distance learning’ with 109 publications followed by ‘Lecture notes in Computer science’ with 59 publications and then ‘IEEE Global Engineering education conference educon’ with 36 publications.

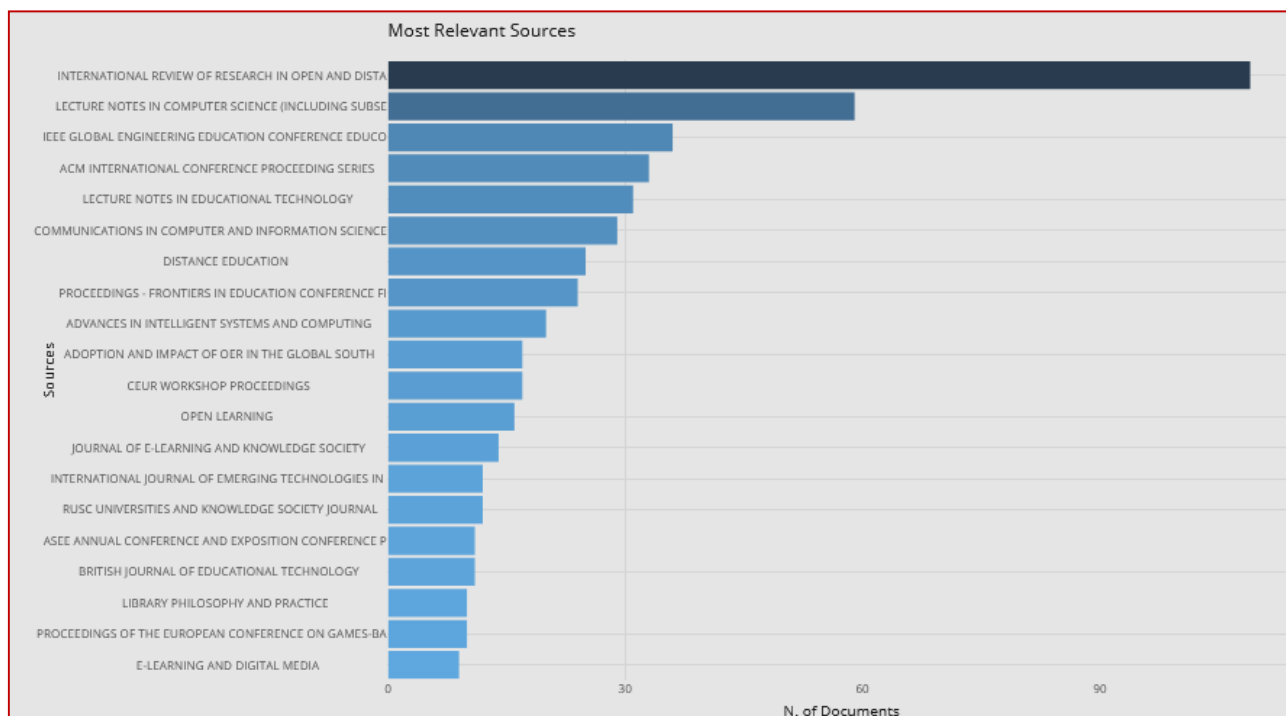


Fig. 6: Scientific production by different publication sources

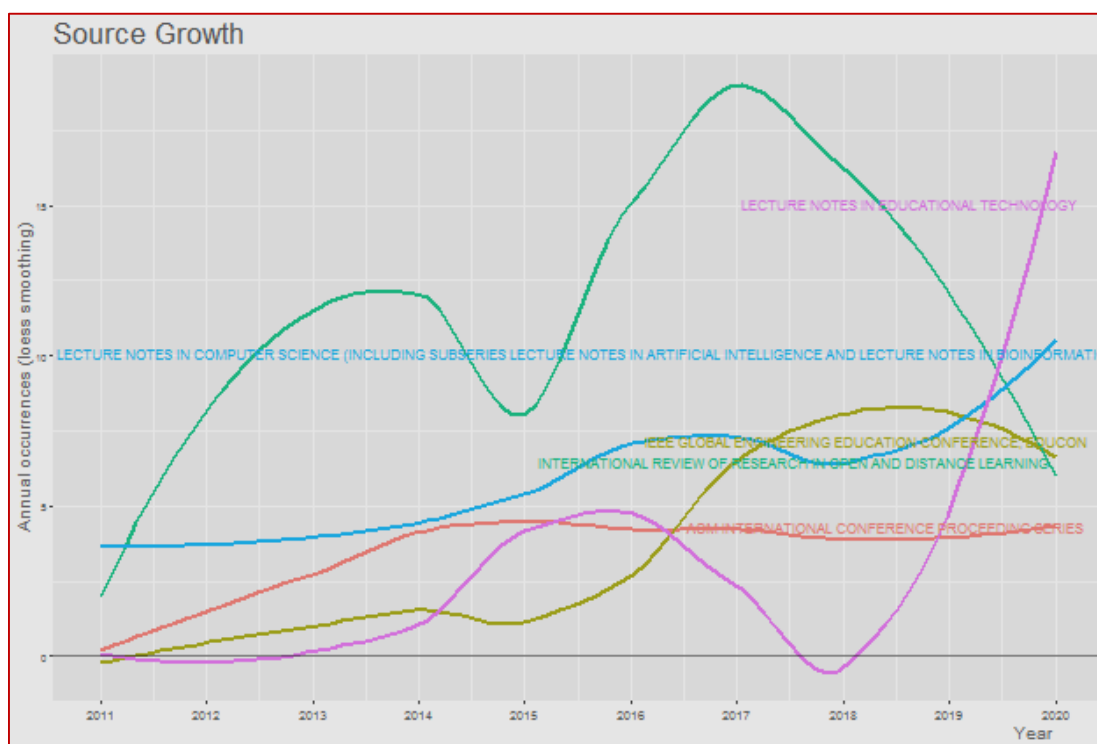


Fig. 7: Source dynamics of different publication sources

The analysis of number of publications per year shows that there is an increasing demand for publication in the publication sources ‘Lecture notes in Educational technology’ and ‘Lecture notes in computer science’ in the area of open educational resources.

4.5. Author based Scientific production

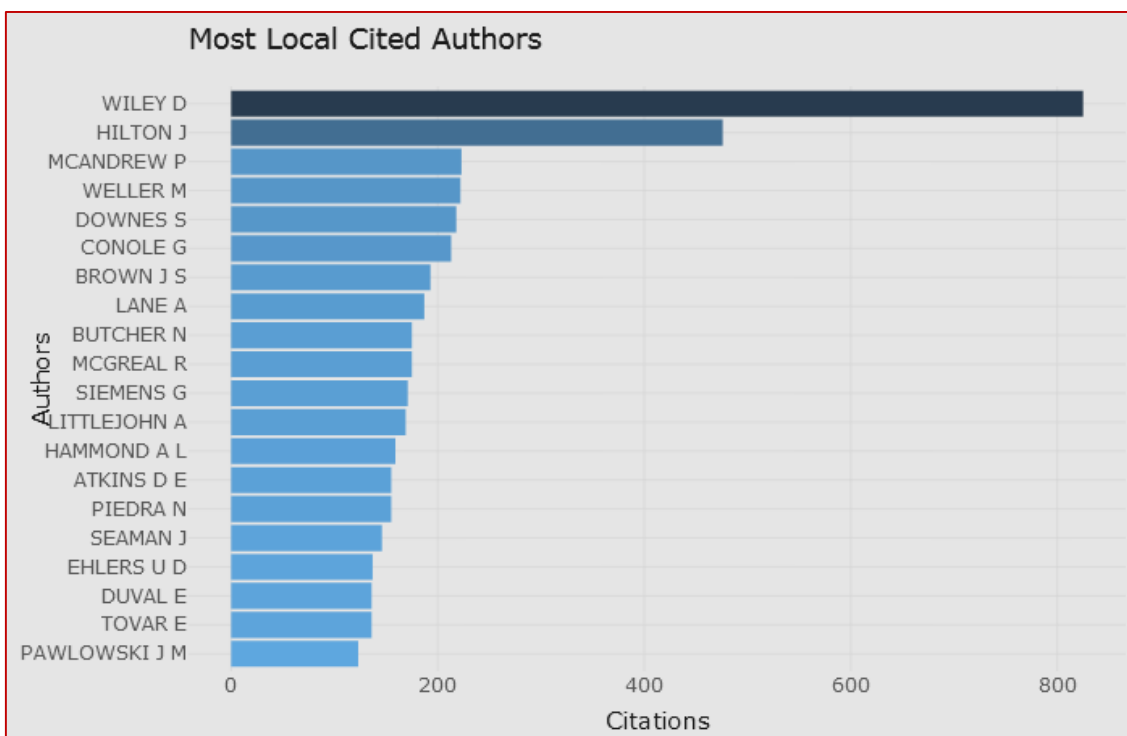


Fig. 8: Top-cited authors by Total Citation count

The citation analysis of the scientific publications (Figure-8) shows that the author Wiley, D has received the highest number of citations (825) followed by Hilton J (476), McAndrew P (223), Weller M (222) and Downes S (218).

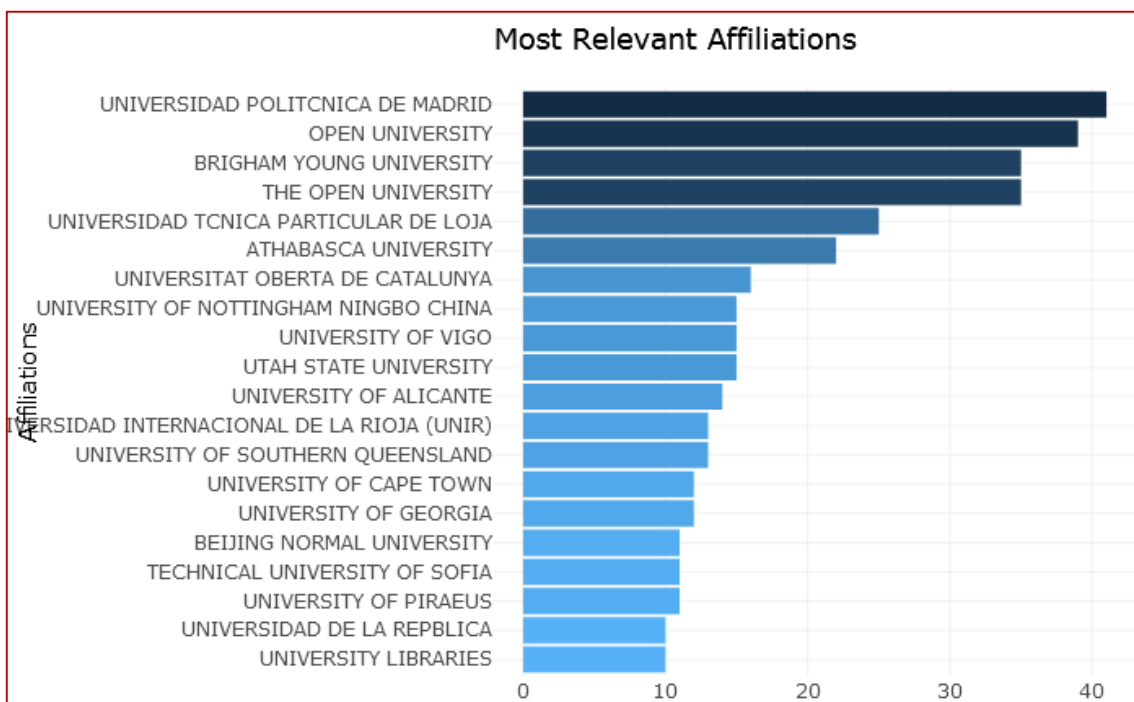


Fig. 9: Author affiliation of scientific publications

It was found from the figure-9 that most of the authors are affiliated to Polytechnic University of Madrid (Spain) followed by The Open University (UK) then Brigham Young University (USA).

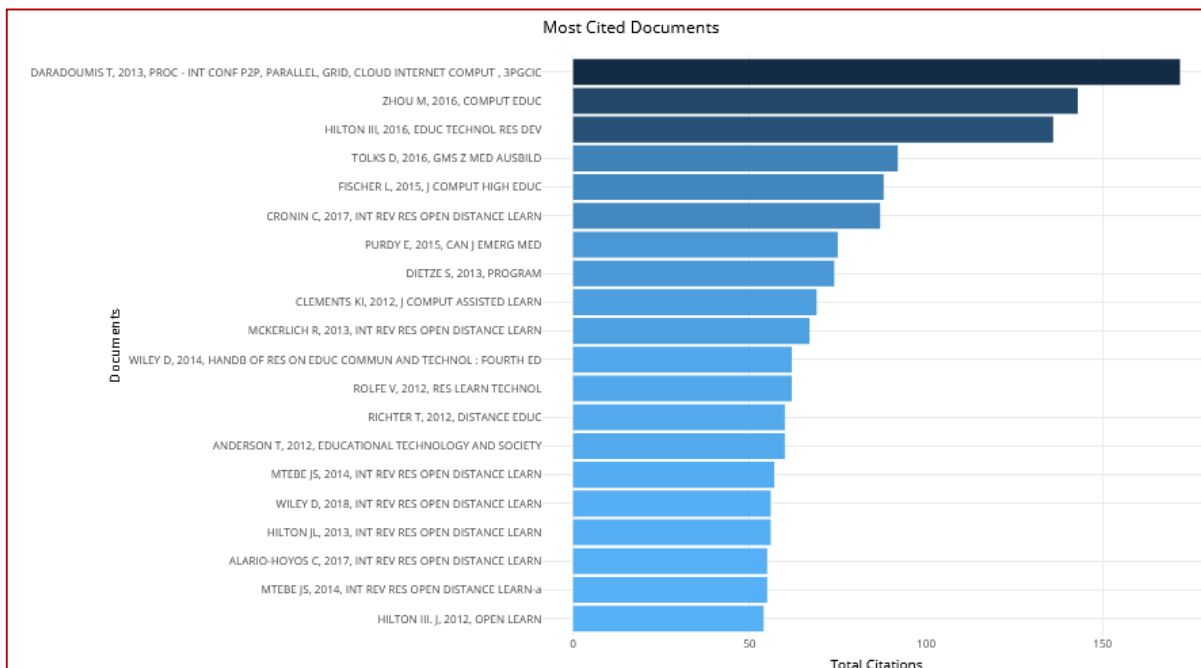


Fig. 10: Top-cited Authors for a single publication

The publication entitled “A Review On Massive E-Learning (Mooc) Design, Delivery and Assessment” by author Daradoumis T published in the year 2013 has received highest number of citations (143). The author Zhou M has received 143 citations for his publication entitled “Chinese University Students' Acceptance of MOOCS: A Self-Determination Perspective”. Hilton J from USA has received 136 citations for his work entitled “Open Educational Resources and College Textbook Choices: A Review of Research on Efficacy and Perceptions”.

5. Keyword Occurrence of Scientific Production :

The keywords provided by the authors of the scientific publication helps in easy retrieval of the documents while searching. These keywords must be very relevant to the theme of the research publication. It was found that most relevant keywords used by the authors based on their occurrences in different publications are Open Educational resources (663), OER (227), Open Education (99), Higher Education (89), e-Learning (79) and Mooc (60). Other relevant author keywords are open textbooks, open educational practices, online learning and blended learning etc (Figure-11).

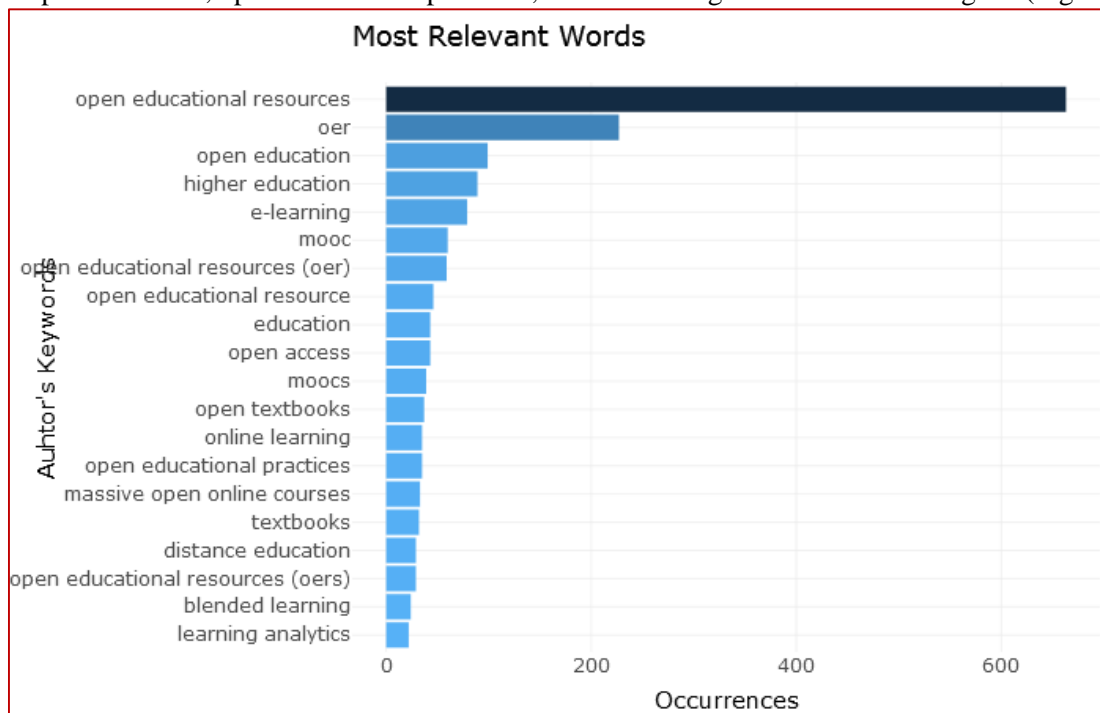


Fig. 11: Author keywords with highest frequency of occurrence



Fig. 12: Word cloud of top-20 author keywords

The word cloud of top 30 author keywords shown in Figure-12 reveals that the terms OER, Open Educational Resources, E-learning, Open education, Mooc, Open access are very relevant the research area of open educational resources.

The word dynamics indicates the growth of words during a time period. The word dynamics shown in figure-13 reveals that the growth of the term ‘open educational resources’, ‘OER’, Open Education and E-learning is in an increasing trend since 2011 till 2020.

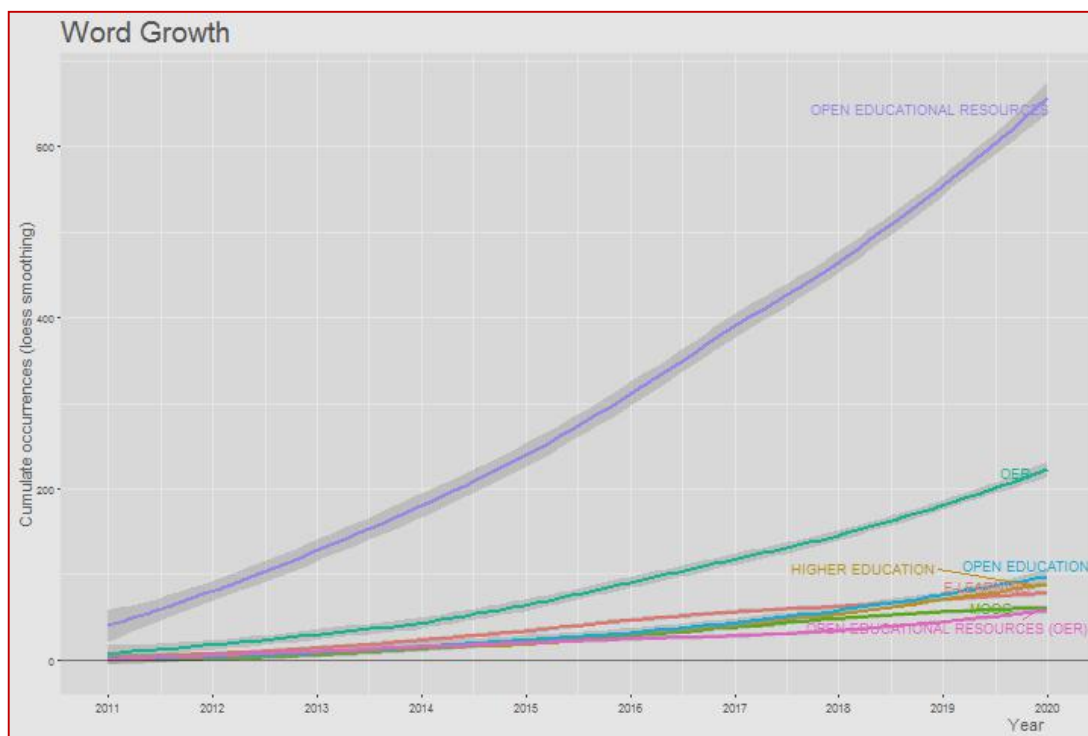


Fig. 13: Word Dynamics top-20 Author keywords

6. FINDINGS AND CONCLUSION :

Bibliometric analysis is a core area of research in the field of library and information science. The present bibliometric study on OER found that the scientific publications are growing in an average annual growth rate of 14.87%. The major part of the publications is in form of articles (47%) and conference papers (37%). Three countries USA, Spain and UK have contributed more than 50% of publications on OER. The countries USA, UK and Germany have received more citations as compared to others. India in 10th rank on the basis of its scientific productivity and 9th

position on the basis of citation received. The countries like Spain, Ecuador, UK, China, Canada and USA evidenced with higher degree of collaboration. The highest number of publication is from the publication source entitled "International review of research in open and distance learning". The demand for publishing in two publication sources namely 'Lecture notes in Educational technology' and 'Lecture notes in computer science' has increased during the study period. The top cited authors are Wiley D, Hilton J, McAndrew P, Weller M and Downes S. The Polytechnic University of Madrid (Spain), The Open University (UK) and Brigham Young University (USA) were found to be the most affiliating institutions. There are three publications which have received more than 100 citations and all others received below 100 citations. The most relevant keywords used by the authors were found to be open educational resources, OER, open education, open textbooks, open educational practices, Mooc, e-Learning, online learning and blended learning. The growth of the terms opens educational resources, OER, open education and e-learning has increased during the study period. These findings evidenced through this study can lead to strengthen the scientific productivity, research collaboration and understanding the research trend in the area of open educational resources.

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