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

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"If I give you a penny, you will be one penny richer and I'll be one penny poorer. But if I give you an idea, you will have a new idea, but I shall still have it, too." Albert Einstein

Abstract

The last many decades have seen dramatic changes to education and clearly demonstrated OER's role in democratizing knowledge and empowering learners around the world. OERs are information resources specifically designed to be freely accessed and authorised to be re-used, re-mixed, and re-distributed. By free resource it doesn't mean that the information is not reliable but it is the most important aspect of the OER that it is open to all. These findings contribute to a broadening perception of the value of OERs and their relevance to the great challenges faced by higher education today. This study intends to explore the recent trends of OER through analysis of its publications. There were a total of 1257 Articles on OER in the Web of Science database which were downloaded and the time span selected was from, 1992-2020. The result shows United States of America exceed in the area of OER publications. Several outcomes regarding the annual trends, top collaborators in terms of journal and institute levels, language, country and the keyword distribution in the highly cited papers, the co-authorship status and the most influential journals and authors are portrayed in this paper.

Keywords: OER, Open access, educational resources, bibliometric analysis

Introduction

OER are broadly defined as "the open provision of educational resources, enabled by information and communication technologies, for consultation, use, and adaptation by a community of users for noncommercial purposes" (UNESCO, 2002, p. 24). OER typically encompass free, online learning content, software tools, and accumulated digital curricula that are not restricted by copyright license and available to retain, reuse, revise, remix, and redistribute. The adoption and implementation of OER textbooks has focused on cost savings by making high-quality educational resources freely available to the students. Furthermore, several studies have shown evidence that the affordability of OER can effectively support at-risk learners in their efforts to finish their studies (de los Arcos et al., 2014; Farrow et al., 2015; Winitzky-Stephens & Pickavance, 2017).

OER can include:

- Textbooks
- Lesson plans
- Learning modules
- Lecture notes and slides
- Syllabi
- Assignments
- Podcasts and videos
- Training materials

Creating, Adapting, Using OER
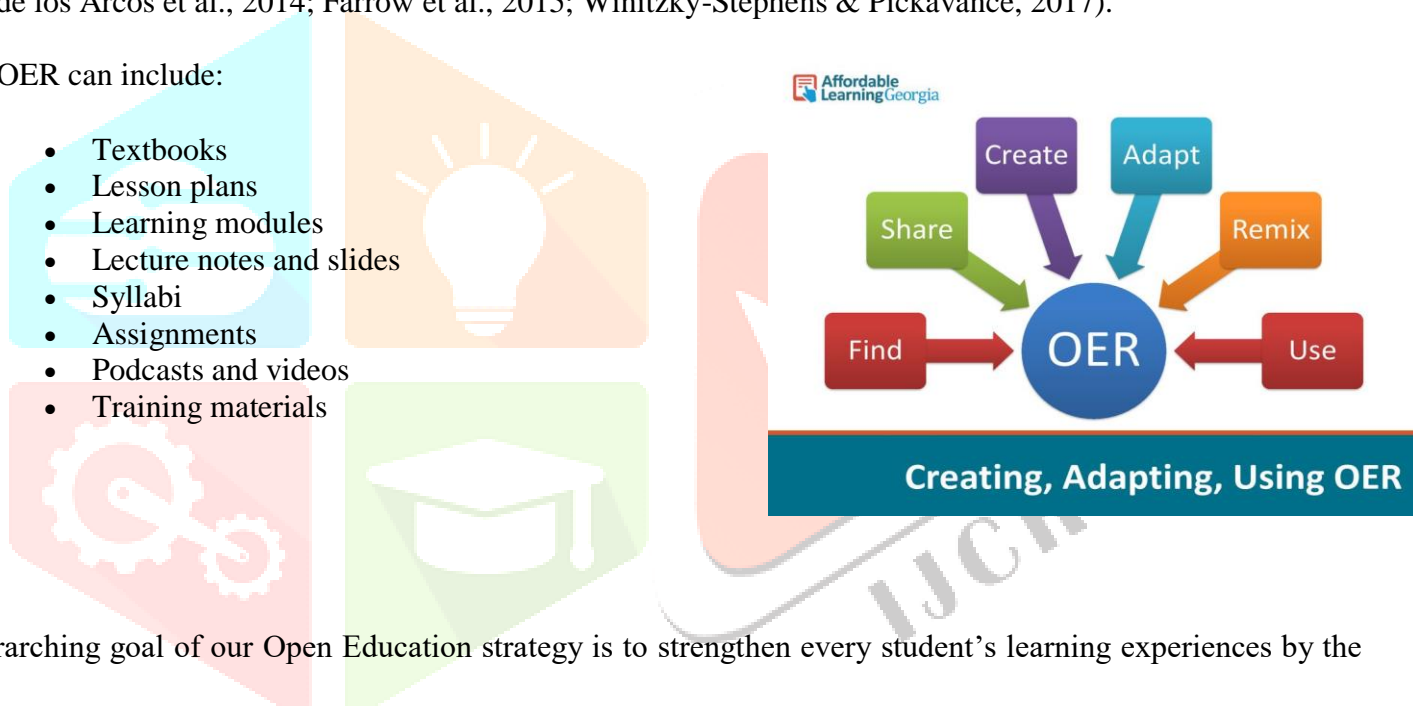
The overarching goal of our Open Education strategy is to strengthen every student's learning experiences by the effective use of open educational resources and practices. To do that, we prioritize developing effective pedagogy and practice along with content, building capacity for education systems to implement OER, and supporting a field that is responsive to diverse educators and learners. Today we could see that students and information seekers are exposed to more and more digital content in an increasing variety of circumstances. As the digital landscape grows and develops students and faculty alike will be exposed to a huge variety of digital content. Already publishers and software designers are competing to come up with better ways for people to view, deliver, and interact with digital content. The ability to download various file formats was essential to the seat-license process but it was only possible because Creative Commons freed the content from its traditional moorings. This flexibility will potentially create more value as more users shift towards low-cost, accessible digital content.

Some academic libraries, however, are pursuing new strategies that revolve around open textbooks. These textbooks are part of the larger Open Educational Resources (OER) movement. Today library publishing programs are becoming more familiar, the creation of open textbooks through these models is just beginning to take shape. Within this landscape, there are important opportunities for libraries to become involved in the publication of open textbooks through their own publishing structures, or in collaboration with university presses and other campus partners, to provide both financial and educational benefits to user community. The LPC's *Library Publishing Directory 2014* describes a broad range of publishing and dissemination activities at 115 academic libraries (Lippincott, 2013).

There are so many places to find OER. Many sites have already curated the content and you just need to be aware of the internet and practice to search and look for OERs.

1. MERLOT — Contains more than 45,000 resources from the California State University System. All resources are rated, peer-reviewed and tallied by how many personal collections each resides in.

2. MIT OpenCourseware — Need OER resources on aeronautics, civil engineering and material science? Then look no further than MIT's library of online textbooks, one of only a few sources for OER in these disciplines.

3. OER Commons — This site from the Institute for the Study of Knowledge Management in Education offers 73,000 kinds of OER, along with tools for creating OER and training on how to use OER.

4. Open Education Consortium — Join this community of more than 240 schools where you'll find an OER resource toolkit, webinars, in-person events and links to open textbooks.

5. Carnegie Mellon University Open Learning Initiative — Find STEM and computing resources on this site from Pennsylvania's Carnegie Mellon University.

6. Saylor Academy — Saylor's site is highly recommended for finding resources in the following disciplines: Art History, Business, Engineering, History, Political Science and Psychology.

7. Project Gutenberg – A collection of tens of thousands of digitized books available for download; audiobooks are also available.

8. The Orange Grove: Florida's Open Educational Resource Repository — Use this Florida-based site to find, use and share a wide range of K-12 and postsecondary resources. You can even integrate this repository with your learning management system.

9. OASIS - Search a wide variety of OER. Then sort by type of source, subject, and/or license. Sponsored by SUNY-Geneseo.

10. OER Knowledge Cloud - The OER Knowledge Cloud is a repository for journal articles, books, data, research, reports, and any other information about Open Educational Resources (OER). This searchable database is updated and maintained by professional librarians and volunteers. The data is fully searchable and all resources are either fully extractable from the Cloud or are linked with a relevant URL.

11. Open Textbook Library (OTN) - Lists open textbooks sponsored by an educational entity, or that have been used in multiple classes. Many books listed have been reviewed by faculty to assess quality.

12. Ilumina - iLumina is a digital library of sharable undergraduate teaching materials for chemistry, biology, physics, mathematics, and computer science

Objectives

- ❖ A bibliometric analysis on OER from 1992 to 2020 depicting the annual trends.
- ❖ Document forms retrieved in OER publications
- ❖ Scholarly Output of Co-Authorship in OER publications
- ❖ Productive output of OER publications from top ten authors, countries/Institutions and journals.
- ❖ Most Influential Language and Keywords timeline view of OER Publications .

Methodology

This study exhibits an exploratory analysis of OER definitions generated from previous studies through Web of Science Database. The timeframe of the academic publications from the Web of Science database was set from the most recent years, i.e. 1992-2020. A set of standards were generated to obtain a suitable sample which includes title and key words as "Open Educational Resources (OER) ". A total of 1257 articles were obtained by following this process. Among these, 23 articles which showed unknown information were deleted. A sample size of 1234 was finally used for analysis. .

Limitations

It should be noted that there are limitations and assumptions made for this study. Present Study is limited to search results in the title of "OER" in Web of Science database during 1992 to 2020. The data analyzed with the help of Microsoft office excel.

Analysis and Interpretation

Table-1 The Annual Trends of OER Publications

Note: TLCS: Total Local Citation Score, TGLS: Total Global Citation Score

Sl.NO	Publication Year	Recs	Percent
1	1992	3	0.2
2	1993	3	0.2
3	1994	5	0.4
4	1995	5	0.4
5	1996	3	0.2
6	1997	6	0.5
7	1998	5	0.4
8	1999	8	0.6
9	2000	9	0.7
10	2001	7	0.6
11	2002	7	0.6
12	2003	12	1
13	2004	13	1
14	2005	14	1.1
15	2006	8	0.6
16	2007	15	1.2
17	2008	22	1.8
18	2009	36	2.9
19	2010	38	3
20	2011	42	3.5
21	2012	81	6.6
22	2013	97	7.9
23	2014	82	6.7
24	2015	102	8.3
25	2016	93	7.6
26	2017	151	12.2
27	2018	139	11.3
28	2019	153	12.4
29	2020	75	6.1
	Total	1234	100

Figure 1 plots the annual trends of OER publications. Especially after 2005, more scholars started to research in this field, which marked a hike in the number of publications. The year 2019 witness 12.4 % data increase whereas in the years 1992-93 contribution was only 0.2 % in the beginning. There are many reasons for the rapid growth. Firstly, with the rapid development of internet technology, people were more likely to obtain massive data. The knowledge of internet and open sources has attracted people from all walks of life. More and more countries began to devote themselves to the researches and applications of OER in all fields of knowledge.
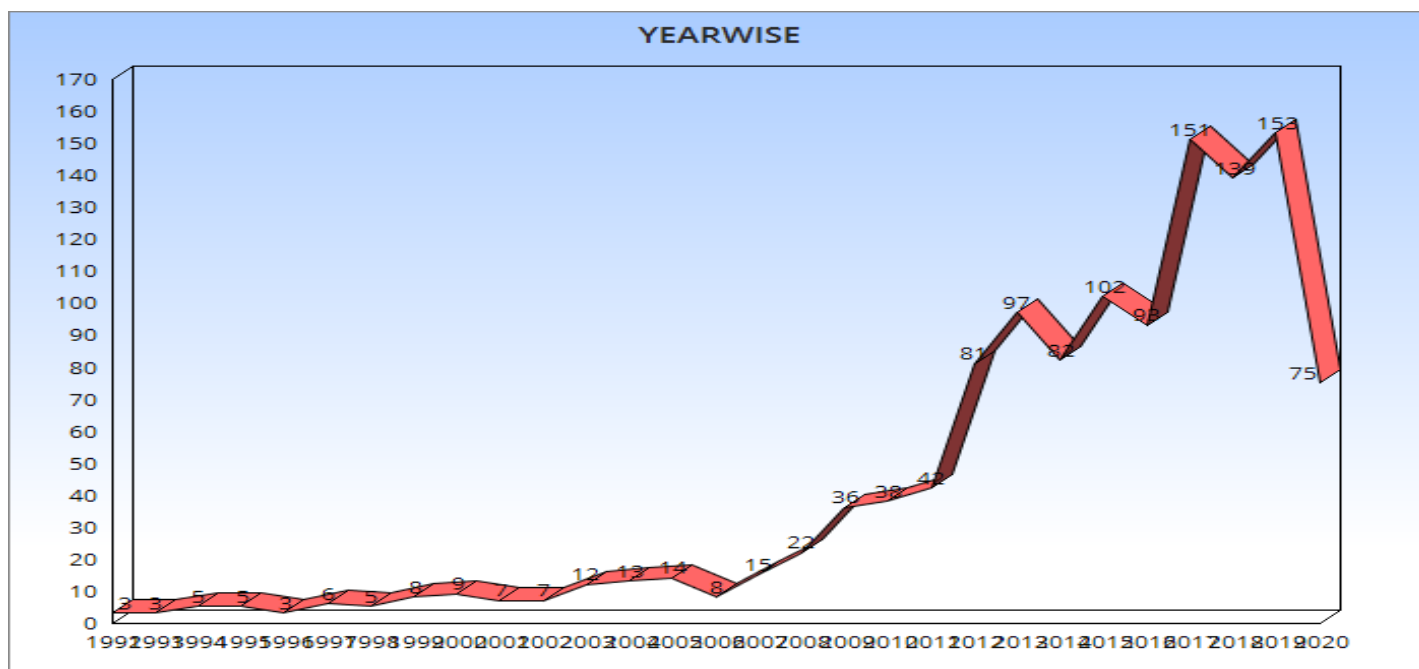
Table-2 Retrieved Documents of OER research publications

Sl.NO	Document Type	Recs	Percent	TLCS	TGCS
1	Article	1088	86.6	679	14966
2	Review	45	3.6	49	683
3	Article; Proceedings Paper	35	2.8	5	937
4	Editorial Material	30	2.4	19	137
5	Article; Early Access	22	1.8	0	2
6	Meeting Abstract	15	1.2	0	0
7	Book Review	14	1.1	1	5
8	Letter	2	0.2	0	2
9	Article; Book Chapter	1	0.1	0	5
10	Correction	1	0.1	0	0
11	News Item	1	0.1	0	0
12	Reprint	1	0.1	0	9
13	Review; Book Chapter	1	0.1	0	259
14	Review; Early Access	1	0.1	0	1

Nine document types were found in these 1234   publications. The most frequent document type is article (1088), accounting for 86.6 % of total publications. At the second position is Review (45), with a proportion of 3.6 %. Other document types including proceedings (35), Editorial Material (30), Article-Early Access (22), Meeting Abstract (15), letter (2and so on.. Table 2 lists the numbers and proportions of various document types. All documents were downloaded on 2nd September 2020.

Table-3 Co- Authorship Documents in OER Research Output

SL.NO	YEAR	SINGLE	DOUBLE	THREE	FOUR	FIVE	ABOVE FIVE	TOTAL
1	1992	1		1	1			3
2	1993	1	1	1				3
3	1994	3		2				5
4	1995	3	2					5
5	1996	1	1	1				3
6	1997	2	3	1				6
7	1998	1	3	1				5
8	1999	3	1	2		1	1	8
9	2000	3	1	4		1		9
10	2001	2	2	1		1	1	7
11	2002	1	1	3			2	7
12	2003	3	2	3	1	2	1	12
13	2004	2	2	5	1	2	1	13
14	2005	3	4	6	1			14
15	2006	1	1	1	3		2	8
16	2007	4	3	2	1	2	3	15
17	2008	6	6	3	1	2	4	22
18	2009	13	2	11	3	4	3	36
19	2010	4	11	7	4	6	6	38
20	2011	7	8	13	5	3	6	42
21	2012	14	22	18	13	4	10	81
22	2013	30	18	13	13	8	15	97
23	2014	14	29	12	11	6	10	82
24	2015	16	20	23	13	14	16	102
25	2016	15	17	18	14	8	21	93
26	2017	28	35	33	19	9	27	151
27	2018	28	31	24	16	9	31	139
28	2019	16	38	32	23	14	30	153
29	2020	7	20	20	6	6	16	75
		232	284	261	149	102	206	1234

Co-authorship research is an important content of bibliometrics and the level of research collaboration is an index to assess the current status of research in a specific field. Table 3 shows that there are 1234 OER publications between 1992 and 2020 (until September 2, 2020). It can be seen that between 1992 and 2007, the average number of authors per paper is less than 4, and since 2008, the number has significantly exceeded 4. Through further examination, the sample found that 75% of articles are written using co-authorship.
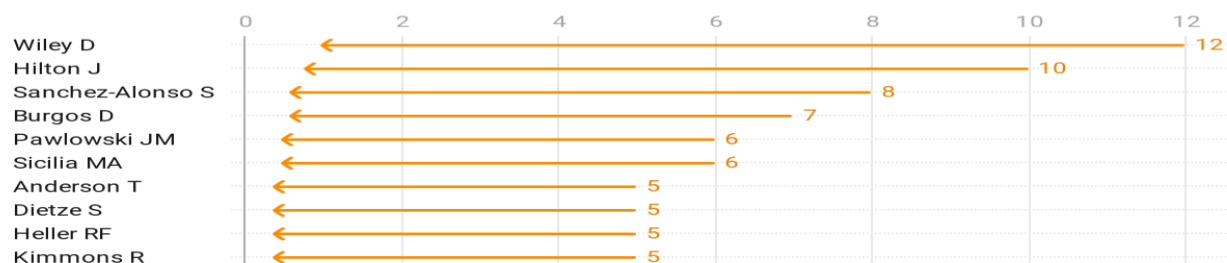
Table-4 Scholarly Output from Top 10 Authors in OER research

SL. NO	Author	Recs	Percent	TLCS	TLCS/t	TLCSx	TGCS	TGCS/t	TLCR
1	Wiley D (*Brigham Young University*)	12	1	87	12.73734	76	227	34.42872	21
2	HiltonJ (*Brigham Young University*)	10	0.8	91	17.36032	80	264	50.00873	42
3	Sanchez-Alonso S (University of Alcala)	8	0.6	11	1.353571	6	102	12.6	7
4	Burgos D (Universidad International de La Rioja)	7	0.6	8	1.866667	3	23	5.733333	28
5	Pawlowski JM (Ruhr West University)	6	0.5	24	2.894444	22	98	13.26111	8
6	Sicilia MA (University of Alcala)	6	0.5	3	0.428571	1	30	4.316667	9
7	Anderson T (Athabasca University)	5	0.4	8	1.055556	8	97	11.72222	5
8	Dietze S (Heinrich-Heine-University Düsseldorf)	5	0.4	13	2.013889	8	109	15.44444	8
9	Heller RF (*P*eoples-uni)	5	0.4	8	1.057143	3	35	3.566667	9
10	Kimmons R (*Brigham Young University*)	5	0.4	7	1.166667	5	23	4.883333	20

In this section, authors of the most cited articles or books by OER publications are studied and presented in Table 4. Wiley D (*Brigham Young University)* represents 12 records with TGCS 227 and Hilton J (*Brigham Young University)* with 10 records and TGCS 264. Kimmons R (*Brigham Young University)* has contributed 5 records with TGCS 23.

Top Ten Authors

■ Author

Author	Value
Wiley D	12
Hilton J	10
Sanchez-Alonso S	8
Burgos D	7
Pawlowski JM	6
Sicilia MA	6
Anderson T	5
Dietze S	5
Heller RF	5
Kimmons R	5

Table-5 Top 10 Productive Journals in OER research

SL. NO	JOURNAL	RECS	PERCENT	TLCS	TLCS/t	TGCS	TGCS/t	TLCR
1	INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTRIBUTED LEARNING	111	8.8	255	46.01273	1098	198.4629	280
2	DISTANCE EDUCATION	23	1.8	97	13.23611	324	42.55	43
3	BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY	21	1.7	34	5.118146	157	26.27899	35
4	COMPUTERS & EDUCATION	16	1.3	9	1.658333	357	47.46761	19
5	IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES	15	1.2	20	2.472222	212	26.29329	22
6	INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING	13	1	37	4.609921	138	15.80516	9
7	SUSTAINABILITY	13	1	0	0	28	8.666667	23
8	EDUCATIONAL TECHNOLOGY & SOCIETY	11	0.9	3	0.422222	106	14.9465	1
9	ETR&D-EDUCATIONAL TECHNOLOGY RESEARCH AND DEVELOPMENT	11	0.9	41	8.6	233	33.2881	35
10	ACADEMIC MEDICINE	9	0.7	2	0.5	142	11.43736	2

Table 5 illustrates the distribution of core journals on OER study. The table shows, INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTRIBUTED LEARNING has the highest record of 8.8 %, TGCS value (1098) followed by DISTANCE EDUCATION (1.8 %) and TGCS 324 are the two leading publications respectively in the table.

Table-6 Scholarly Output on OER research by Top Ten Countries

SL.NO	COUNTRY	RECS	PERCENT	TLCS	TGCS
1	USA	455	36.2	294	7682
2	UK	187	14.9	161	4337
3	Spain	108	8.6	35	1691
4	Canada	99	7.9	77	2221
5	Australia	79	6.3	40	2401
6	Germany	60	4.8	57	1621
7	Peoples R China	40	3.2	10	1272
8	South Africa	36	2.9	24	979
9	Italy	31	2.5	10	1278
10	Sweden	31	2.5	11	1058

In terms of countries, Table 6 reveals that USA ranks at the top (455/36.2%) with majority of the publications output of OER Contribution .UK (1487/14.9%), Spain 108/8.6%),Canada (99/7.9%), followed by Australia Germany, China , South Africa, Italy and Sweden respectively have published more than thirty articles.
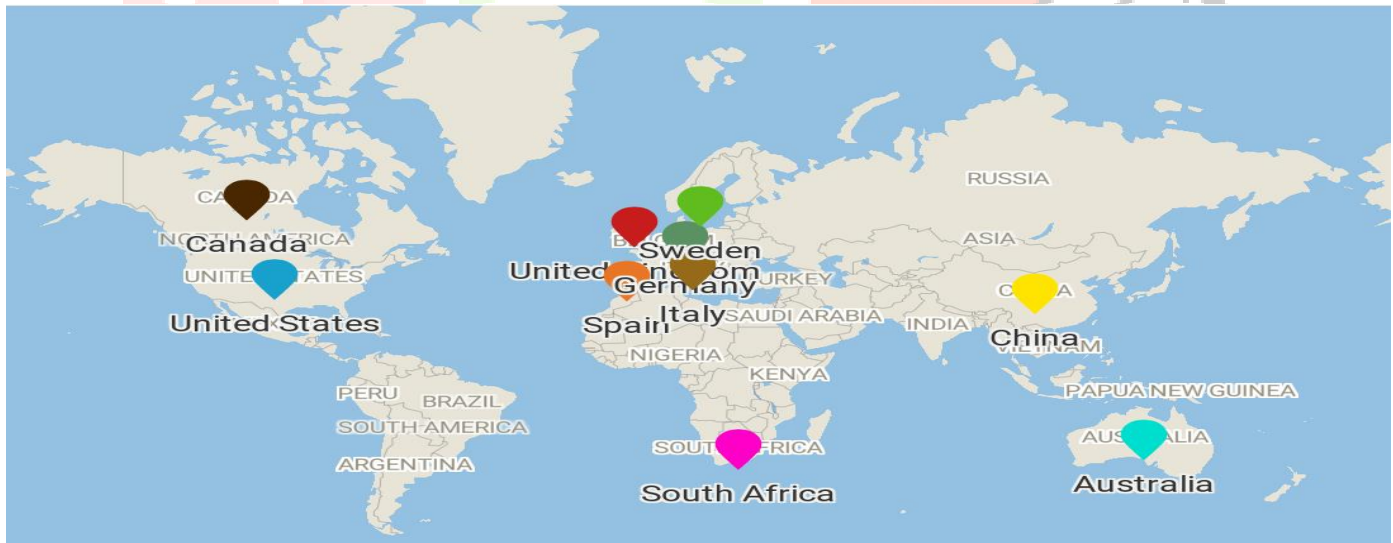
Table-7 Top ten Institution wise OER research publications

SL.NO	INSTITUTION	RECS	PERCENT	TLCS	TGCS
1	Open Univ (UK)	30	2.4	71	500
2	Brigham Young Univ(USA)	26	2.1	155	439
3	Univ Toronto(Canada)	21	1.7	7	972
4	Univ Minnesota (USA)	17	1.4	9	195
5	Univ Calif San Francisco(USA)	16	1.3	10	836
6	Univ Florida(USA)	16	1.3	11	139
7	Univ British Columbia(Canada)	15	1.2	19	1047
8	Univ Alcala De Henares(Spain)	13	1	12	139
9	Univ N Carolina(USA)	13	1	0	753
10	Athabasca Univ(Canada)	12	1	29	146

Institution wise distribution of research output is sorted out in Table 7. Open Univ (UK)stands first with 30 records with a TGCS of 71, Brigham Young Univ (USA) stands with 26 records and TGCS 155 and the lowest record count is represented by Athabasca Univ (Canada) with 12 records and TGCS 29.

Table-8 Keywords in OER Publications

SL.NO	WORDS	RECS	PERCENT	TLCS	TGCS
1	OPEN	348	27.7	519	3065
2	EDUCATIONAL	318	25.3	382	2636
3	RESOURCES	228	18.1	348	1835
4	EDUCATION	205	16.3	177	2429
5	LEARNING	185	14.7	93	2330
6	BASED	86	6.8	10	948
7	ONLINE	81	6.4	32	763
8	STUDENTS	69	5.5	40	911
9	OER	66	5.3	134	544
10	RESOURCE	61	4.9	12	464

A visually designed word cloud will depict the commonly used words within the sampled articles, as shown in Figure eight. The terms, like Open, Educational, Resources, Education, Learning, Based, Online, Students, OER,

Resource etc. are highlighted. This finding is probably going to point that, within the field of OER, these terms are regularly cognized as vital keywords for study..

word wise distribution
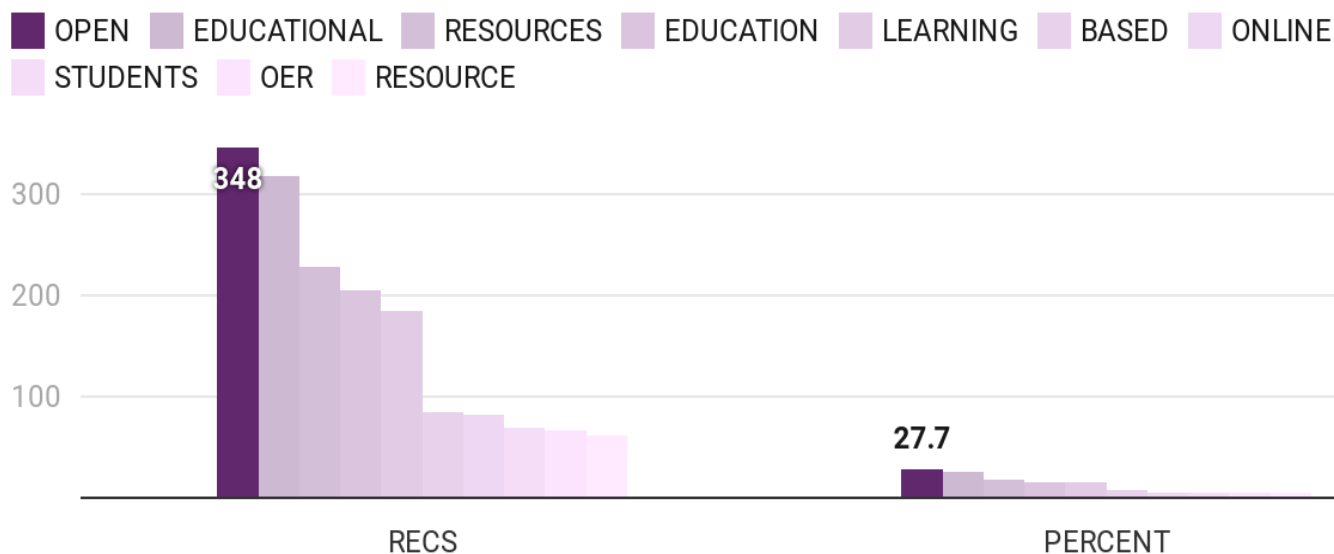
Table-9 Distribution of OER Publication Language Wise

S.NO	Language	Recs	Percent	TLCS	TGCS
1	English	1194	95	753	16677
2	Spanish	38	3	0	184
3	German	13	1	0	85
4	French	5	0.4	0	6
5	Portuguese	5	0.4	0	54
6	Afrikaans	1	0.1	0	0
7	Korean	1	0.1	0	0

      The analysis revealed that a total of 7 Languages contributed to the generation of the articles sampled. Figure 9 lists the top seven languages in which scholarly outputs are derived. Of the top seven languages, English and Spanish are the top two that reveal their publications on OER as outstandingly high.

Conclusion

This research suggests OER is an equity strategy for higher education and an area of growing interest. A new opportunity appears to be present for institutions in higher education to consider how to leverage OER to address completion, quality, and affordability challenges. Academic librarians can be at the forefront of universities seeking to establish programs that facilitate the creation and adoption of open textbooks. As more schools transition to at-home and distance learning during the COVID-19 crisis, there are hundreds of new people and places joining the digital learning field for the first time, where OER gaining its priority in this decade. The study bespeaks the need for more research on the OER movement specifically for fresh evaluations of individual outcomes and user statistics to mould better knowledge content on this area of importance. OER is thus a promising drive for reducing the expenditure of higher education nevertheless increase academic success.

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