Mapping of Indian Education Research: A Scientometric Analysis of Research Output During 2008-2017

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Abstract - *The present paper, an analysis of Indian education literature has been presented using its publication output in international peer reviewed journals covered in Web of Science database. It analyses India's publication activity in terms productivity for the period 2008-2017. The paper also explores the various aspects of the research area. The database provided 919 records and received 2,372 citations, with 2.58 an average citations per paper during the period. This paper attempt to provide the growth of literature using scientometric tools in field of education over the span of ten years.*

Keywords: Mapping, Education, Scientometrics, Growth, Collaboration and Sources.

Introduction

Scientometrics is an application of quantitative methods to the history of science. It is also one of the techniques for documenting works of eminent scientist and researchers. Scientometrics is a discipline which analyses scientific publications to explore the structure and growth of science.The application of quantitative methods to the history of science, Scientometrics is the science of measuring the science, which involves counting artifacts to the production & use of information and arriving conclusions from the counts. Bibliometrics/ Scientometrics research includes studies related to the scattering & growth of literature, author productivity, obsolescence of documents, distribution of scientific literature by country, by language, etc., which helps to monitor the growth & pattern of research (Sangam, 2011).

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Educational methods include storytelling, discussion, teaching, training, and directed research. Education frequently takes place under the guidance of educators, but learners may also educate themselves. Education can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. The methodology of teaching is called pedagogy.

Education is commonly divided formally into such stages as preschool or kindergarten, primary school, secondary school and then college, university, or apprenticeship.In most regions, education is compulsory up to a certain age (*Wikipedia*, 2018).

Mapping is a process of reorganizing and rearranging the most important ideas and information identified by reading the literature and converting it into a diagram with symbols which helps us to understand and remember easily. Mapping is much simpler; it is done in two levels i.e. macro- level mapping and micro-level mapping. Macro-level aims to capture the overall feature of the disciplines, and the micro-level relates to analysis of individuals in the disciplines. The key elements of macro-level are component, distance, cluster, degree distribution and error.

As mapping is knowledge based for a given field it requires understanding of the process and its different forms. There should be a thorough understanding of the mapping methodology. It is necessary to identify the key concepts, ideas and methods and also should have knowledge about classification of the key concepts and forming relationships between them (Sangam&Mogali, 2013).Only few scientometric studies have been carried in this area in the past.

Objectives

The main objective of this study is to analyze the Indianeducation research output for the period of ten years. The specific objectives are (i) to find the India's research output, its growth, rank and share of leading countries, (ii) theshare of international collaboration papers, (iii) output and impact by different types of research, and by different authors and institutions (iv) publication productivity of leading source titles; and (v) media of communication of theresearch output.

Methodology

The data for the present study were retrieved from Web of Science database, by using suitable search syntax, the data has been downloaded for the period 2008-2017.Dr. Eugene Garfield revolutionaryconcept of citation indexing, the*Web of Science* has launched in 1997 and now it is maintained by *Clarivate Analytics*.Web of Science provides access to an unrivalledbreadth of world class research literature linked to arigorously selected core of journals, ensuring a uniquecombination of discovery through meticulouslycaptured metadata and citation connections, coupledwith guaranteed quality, impact and neutrality The collected data were analyzed using MS-Excel Spreadsheet and MS-Word.The string used to retrieve the data on education research in India during 2008-2017 as follows:
SU= (Materials Science) AND CU= (India) AND PY= (2008-2017).

Analysis and Discussion

Growth of publications and citations of the Indian education research

The India'sresearch output on education during 2008-2017 consistedof 919 papers, which steadily increased from 26 papers in2008 to 233 papers in 2017. The India's cumulative publication output has increased from 178 publications during 2008-12 to 741 publications during 2013-17, registeringa growth rate of 91.09%. We collected the number of citations received each year. These numbers are expected toincrease as the number of articles that can be cited increases each year. In terms of impact and citation quality, India has produced 919 publications and received 2372 citations, the averagecitation registered by publication was 2.58 during 2008-17 which decreased from 9.71 during 2008-12 to 0.87 during 2013-17.(Table 1).

Table 1: Growth of publications and citations of the Indian education research

Years	TP	TC	ACP	H-Index	% of 919
2008	26	193	7.42	8	2.83
2009	35	306	8.74	10	3.81
2010	39	557	14.28	12	4.24
2011	38	490	12.89	10	4.14
2012	40	182	4.55	7	4.35
2013	41	236	5.76	9	4.46
2014	28	64	2.29	4	3.05
2015	214	177	0.83	6	23.29
2016	225	131	0.58	4	24.48
2017	233	36	0.15	3	25.35
2008-2012	178	1728	9.71		
2013-2017	741	644	0.87		
2008-2017	**919**	**2372**	**2.58**	**20**	

Note- TP= Total Publications, TC= Total Citations, ACP= Average Citations per Publications

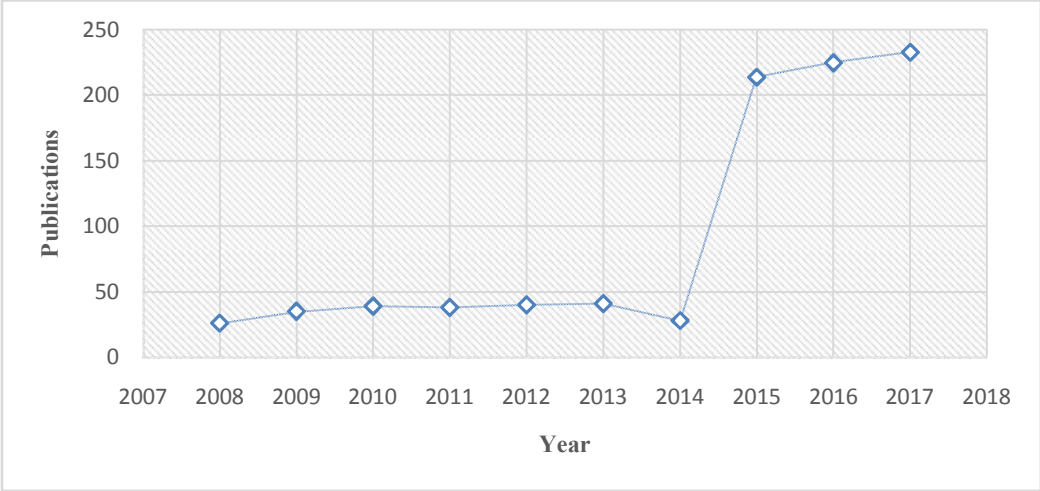

Fig. 1: Year-wise of growth of publications in Indian education research

Productive media of communication in Indian education research

The articles constituted 82.59% share (759) of the total India's research output in education literature during 2008-17, followed by book review (7.40%, 68publications), editorial material (4.57%, 40publications), review (1.74%, 15 publications), biographical item (1.52%, 14publications), meeting abstract (1.52%, 12 publications), and others appearing as articlesin proceedings paper, letter and correction etc.

Table: 2Productive media of communication in Indian education research

Sl. No.	Document Types	Publications	% of 919
1	Article	759	82.59
2	Book Review	68	7.40
3	Editorial Material	40	4.57
4	Review	15	1.74
5	Biographical Item	14	1.52
6	Meeting Abstract	12	1.52
7	Proceedings Paper	5	0.54
8	Letter	4	0.44
9	Correction	2	0.22
	Total	**919**	**100**

Language-wise distribution of Indian education research

The table 2 indicates that 99.13% (911publications) of the India's publications in education appeared in English language, followed by Spanish (0.544%, 5 papers) and less than 1% of papers published in German, French and other languages.

Table: 2 Language-wise distribution of Indian education research

Sl. No.	Languages	Publications	% of 919
1	English	911	99.13
2	Spanish	5	0.54
3	French	1	0.11
4	Portuguese	1	0.11
5	Turkish	1	0.11
	Total	**919**	**100**

Contribution of highly productive authors in Indian education research

The many authors involved in Indian education research, the table indicates that six authors have published a higher number of articles than the group average(7.2): Nityananda, R. with 22 papers followed by Mishra, S. (18 papers), Kalelkar, C. and Sury, B. published 10 papers, Sharma, R. and Sharma, S. published 8 papers respectively, Sharma, R. C. (7 papers) and Bansal, A. published 6 papers (Table 3).

Table: 3 Contribution of highly productive authors in Indian education research

Sl. No.	Rank	Authors	Publications	% of 919
1	1	Nityananda R	22	2.35
2	2	Mishra S	18	1.96
3	3	Kalelkar C	10	1.09
4	3	Sury B	10	1.09
5	4	Sharma R	8	0.88
6	4	Sharma S	8	0.88
7	5	Sharma R C	7	0.76
8	6	Bansal A	6	0.65
9	6	Dangwal R	6	0.65
10	6	Gupta P C	6	0.65

11	6	Konar S	6	0.65
12	6	Kumar A	6	0.65
13	6	Mehrotra D	6	0.65
14	6	Nath B	6	0.65
15	6	Rajaraman V	6	0.65
16	6	Singh A	6	0.65
17	7	Gupta A	5	0.54
18	7	Nag S	5	0.54
19	7	Ramadas J	5	0.54
20	7	Roy A	5	0.54
21	7	Singh S	5	0.54
22	7	Sivaram S	5	0.54
23	7	Venkhatesh V P	5	0.54
24	8	Ansari MS	4	0.44
25	8	Arora M	4	0.44
		Total	**919**	**100**

Research profile of the highly productive institutions in Indian education research

The top 15 most productive institutions involved in Indian education researchindividually published 65 to 9 papers and together published473 papers, accounting for 51.47% share of India's total publications during2008-17. The scientometric profile of these 15 organizations along withtheir research output, citations received, and h-index values are presentedin Table. Six institutions have registered a higher publication share thanthe group average productivity of 18.92 articles per institution: The Indian Institute of Technology has published the highest publications i.e. 65, followed byIndian Institute of Science, Bangalore (46 papers), Tata Institute of Fundamental Research (38 papers), Indira Gandhi National Open University (32 papers), Department of Science Technology India (30 papers), AzimPremji University (26 papers), Indian Institute of Technology IIT Kharagpur (19 papers), University of Delhi (18 papers), Indian Statistical Institute (17 papers), Indian Institute of Technology IIT Bombay (15 papers) and Tata Institute of Social Sciences has published 14 papers.(Table 4).

Table: 4 Research profile of the highly productive institutions in Indian education research

Sl. No.	Rank	Organizations-Enhanced	Publications	% of 919
1	1	Indian Institute of Technology IIT	65	7.07
2	2	Indian Institute of Science IISC Bangalore	46	5.01
3	3	Tata Institute of Fundamental Research	38	4.14
4	4	Indira Gandhi National Open University	32	3.48
5	5	Department of Science Technology India	30	3.26
6	6	AzimPremji University	26	2.83
7	7	Indian Institute of Technology IIT Kharagpur	19	2.07
8	8	University of Delhi	18	1.96
9	9	Indian Statistical Institute	17	1.85
10	10	Indian Institute of Technology IIT Bombay	15	1.63
11	11	Tata Institute of Social Sciences	14	1.52
12	12	Indian Institute of Technology IIT Madras	13	1.42
13	12	National University of Educational Planning Administration India	13	1.42
14	12	Council of Scientific Industrial Research CSIR India	12	1.31

15	12	Jawaharlal Nehru University	12	1. 31
16	12	Manipal University	12	1. 31
17	12	Public Health Foundation of India	12	1. 31
18	12	Raman Research Institute	12	1.31
19	13	Harvard University	11	1.20
20	14	Amity University	10	1.09
21	14	Vellore Institute of Technology	10	1.09
22	15	Anna University	9	0.98
23	15	Anna University Chennai	9	0.98
24	15	Banaras Hindu University	9	0.98
25	15	Indian Institute of Science Education Research IISER Pune	9	0.98
		Total	**545**	**59.30**

Major journals preferred by researchers of Indian education literature

It is an accepted fact that most ofthe scholarly communication of scientific research ispublished in periodicals and sometimes presented in the conferencesand, those conference papersare further updated andpublished in journals of the respective field ofknowledge. Therefore, scientific communication isbeing mostly made through subject periodicals, asthey are termed as primary vehicles of researchcommunication.The table 5 explores the productive journals in the field of Indian education research, individually published 6 to 246 papers and together contributed 545 papers, constituting 59.30% share of India's total output.*Resonance Journal of Science Education*was the highly productive journal with 246 papers, followed by *MIER Journal of Educational Studies Trends and Practices*(38 papers), *British Journal of Educational Technology* (34 papers), *Education and Information Technologies*and *International Journal of Educational Development*have published 20 papers respectively in the field of Indian education research during 2008-2017 (Table 5).

Table: 5Major journals preferred by researchers of Indian education literature

Sl. No.	Source Titles	Publications	% of 919
1	Resonance Journal of Science Education	246	26.77
2	MIER Journal of Educational Studies Trends and Practices	38	4.14
3	British Journal of Educational Technology	34	3.7
4	Education and Information Technologies	20	2.18
5	International Journal of Educational Development	20	2.18
6	BMC Medical Education	18	1.96
7	Journal of Intellectual Disability Research	16	1.74
8	Compare A Journal of Comparative And International Education	13	1.41
9	Health Education Research	12	1.31
10	International Journal of Educational Sciences	12	1.31
11	ELT Journal	11	1.20
12	Educational Technology Society	10	1.09
13	Journal of Workplace Learning	9	0.98
14	AIDS Education and Prevention	8	0.87
15	International Journal of Emerging Technologies In Learning	8	0.87
16	International Journal of Science Education	8	0.87
17	Quality Assurance in Education	8	0.87
18	He Kupu (Online Journal)	7	0.76
19	Higher Education	7	0.76
20	Policy Futures In Education	7	0.76
21	Reading and Writing	7	0.76

22	Ride the Journal of Applied Theatre and Performance	7	0.76
23	Social Work Education	7	0.76
24	Academic Psychiatry	6	0.65
25	International Journal for Educational and Vocational Guidance	6	0.65
	Total	**545**	**59.30**

Education publication output in context of different research areas

The Indian publication output in education research has been publishedin context of different research areas as retrieved from Web of Science database.The highest publication share came from education educational research i.e. 575 papers and received 1675 citations and average citations per paper is 2.91, followed by education scientific disciplines has published 319 articles and received 416 citations, education special has published 54articles and received 478 citations, 8.85 with average citations per paper, rehabilitation has published37articles and received 457 citations, public environmental occupational health has published 30articles and received 233 citations, psychiatry has published23articles and received 71 citations, linguistics has published 21 articles and received 55 citations, and language linguistics has published 19articles and received 55 citations with 2.89 average citations per paper (Table 6).

Table 6: Subject-wise (Research Areas) distribution of Indian publications in education research

Sl. No.	Rank	Research Areas (Web of Science Categories)	TP	TC	ACP	H-Index	% of 919
1	1	Education Educational Research	575	1675	2.91	18	62.57
2	2	Education Scientific Disciplines	319	416	1.30	11	34.71
3	3	Education Special	54	478	8.85	10	5.88
4	4	Rehabilitation	37	457	12.35	9	4.03
5	5	Public Environmental Occupational Health	30	233	7.77	10	3.26
6	6	Psychiatry	23	71	3.09	4	2.50
7	7	Linguistics	21	55	2.62	4	2.29
8	8	Language Linguistics	19	55	2.89	4	2.07
9	9	Clinical Neurology	16	34	2.13	1	1.74
10	9	Genetics Heredity	16	34	2.13	1	1.74
11	10	Psychology Educational	13	75	5.77	6	1.42

Publication share of most productive countries

The many countries have collaborated on education research the highest international collaboration in cumulativepublication output of top most productive countries in 2008-17 was registered by USA (11.75%), followed by England(5.01%), Australia (2.18%), Germany (1.09%), Canada (1.09%),Netherlands,Peoples R China, South Africa, Spain, Switzerland and many countries contributed less than 1%.

Table: 7 Publication share of most productive countries

Sl. No.	Rank	Countries/Regions	TP	% of 919
1	1	USA	108	11.75
2	2	England	46	5.01
3	3	Australia	20	2.18
4	4	Canada	10	1.09
5	4	Germany	10	1.09
6	5	Netherlands	9	0.98

7	5	Peoples R China	9	0.98
8	6	South Africa	8	0.87
9	6	Spain	8	0.87
10	7	Switzerland	7	0.76
11	8	Italy	6	0.65
12	8	Scotland	6	0.65
13	8	Sweden	6	0.65
14	9	Israel	5	0.54
15	10	France	4	0.44
		Total	**262**	**28.51**

Conclusion

The study provides an overview of growth anddevelopment of research output in the field of Indian education literature as reflected in Web of Science. It is found from the publications count it is shows an increasing trend with qualitative publishing. Research in education particularly for developingnations like India there is much to do toimprove the growth and development ofscholarly output in the particular field toimprove and advance stability of the nation. India had published 919 papers in education during the period asreflected in *Web of Science* indexing database. India's publications are graduallyincreased year by year. This analysis proves that there is anincreasing trend in the Indian microbiology research.

Scientometric techniques are very important tools for analyzing research performance. Citationanalysis constitutes an important tool in quantitative studies of any research. Toassess the quality of a given publication, the number of times it has been cited in the literaturecan be counted. Findings of the study are likely to be of some help in formulating policiesregarding interlay budget allocation for different categories of bibliographic forms andsubscription of periodicals.

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