

## Bibliometric Analysis of Indian Journal of Educational Technology (2019-2023)

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The Indian Journal of Educational Technology (IJET) is the open-access journal first published in 2019 by one of the constituent units of the National Council of Educational Research and Training (NCERT) i.e. Central Institute of Educational Technology (CIET) in the field of application of technology in teaching and learning at different levels of education in India. IJET has completed its journey of five years in the year 2023. This research paper studied the various bibliometric aspects of publication such as year-wise publication of articles, the pattern of authorship, degree of collaboration, average length of pages per article, average number of references per article, types of references used in articles, geographical contribution of authors and subject analysis as per the themes of the journal. As IJET is an open-access journal, all the issues are downloaded and data is analysed for all the objectives. A total of 158 articles have been published during the period of study i.e. 2019-2023 are analysed. Maximum articles were published in the year 2022 with 44 publications i.e. 27.85 % and minimum in the first year of its publication with 10 articles. Joint authorship with 79 articles is preferred over single authorship with 59 articles. The degree of collaboration is found 0.63 which shows that writing in collaboration is favoured by authors. The average no. of pages per article ranges from 9 to 12 pages and the average no of references per article is 21.36. The article is the highest type of reference used by authors during citations and Delhi is found as the highest contributor geographically in India which is followed by Tamilnadu and Maharashtra. Information and communication technology in education is identified as the most concentrated subject among all subjects with 31(19.62%) articles followed by Online courses for school and teacher education with 17(10.75%) articles.

**Keywords:** *Educational Technology, ICT in Education, Bibliometrics Analysis, Authorship Pattern, Authors Collaboration, NCERT, Indian Journal of Educational Technology (IJET)*

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## 0 INTRODUCTION

Information and Communication Technology (ICT) integration is universal in every sphere. The application of ICT in teaching teaching-learning process is the hub for imparting education and School Education is the foundation for all levels of education in the whole world. Central Institute of Educational Technology (CIET) is one of the renowned constituent units of National Council of Educational Research and Training (NCERT). With the merger of the Center for Educational Technology and the Department of Teaching Aids, CIET was established in the year 1984 as a national institute of educational technology to promote the utilization of radio, T.V., films, and satellite communications in school and teacher education.

CIET is a premiere institute situated in NCERT campus, New Delhi dedicatedly working for the development and dissemination of teaching-learning resources in various formats using digital platforms with the latest technologies such as audio, video, multimedia, interactives, films, flip books, audiobooks, channels for individual classes along with imparting training to teachers for understanding, learning and using innovative technologies in disseminating the content for school education to outreach the remote levels and to enhance the access and thus continuous learning without physical barriers. The core area of CIET revolves around the Application of technology in education and with the advent need to initiate the medium of dissemination of scholarly information in Indian context, CIET planned to bring the journal with the title **“Indian Journal of Educational Technology” (IJET)** with the following objectives:

- To provide easy access by facilitating its peer reviewed content in open access
- To promote scholarly research among stakeholders of education and provide the platform for covering inter-disciplinary areas of educational technology (ET) for school education and teachers' education
- To share new ideas, experiences, various educational practices, application of innovative teaching methodologies, evaluation, findings and monitoring to enhance teaching learning practices

## 1 ABOUT INDIAN JOURNAL OF EDUCATIONAL TECHNOLOGY (IJET)

CIET, NCERT initiated the publication of Indian Journal of Educational Technology (IJET) with its first issue with volume one in the January 2019 with bi-annual periodicity. The ISSN of this open access journal is 2581-8325 and published only in online mode with full-text access facility through NCERT website <https://ncert.nic.in/journals-and-periodicals.php>. IJET is double-blind peer reviewed journal of India listed in the UGC CARE List-Group I and includes the various categories of articles under the headings such as editorial, research articles, review articles, general articles, opinion, communications, book review,

correspondencenews/seminar/conferences. This journal provides the clear-cut instructions to the contributors with the word limits, references style and plagiarism report. "The theme of the journal revolves around the subject Education Technology (ET) and its application in various aspects of teaching-learning such as Information and Communication Technology (ICT) in education, distance education and technology, technological integration into pedagogy, Open Educational Repositories (OER) and FOSS Innovation in educational system, technology cognition and curriculum, Mobile learning, Inclusive education with technology support, virtual and augmented reality, artificial intelligence, robotics and education digital games, toys, simulations, digital books and education, impact of technology on learning, social media and children, Economics of technology and technological transfer, educational technology in smart governance and delivery of digital contents, educational planning administration and technology and Online courses for school and teacher education etc."

## 2 BIBLIOMETRICS

Bibliometrics is combination of two words biblio(Latin word) meaning book, paper and metrics (Greek word) meaning science of measurement. In simple language, it can be understood as application of mathematical and statistical methods to study the various bibliographic variables, publication pattern of documents such as books, journals, theses etc., authorship, publisher, subject keywords, references etc. This term first appeared in print in 1969 by Alan Pritchard and defined as "the application of mathematical and statistical methods to books and other media of communication". (Pritchard, 1969). After that Scientometrics, Infometrics, Webometrics, Cybermetrics are also evolve to study particular aspects of particular types of information through different sources and formats.

Definition of Bibliometrics: Hawkins, D.T. (1977) inferred bibliometrics as "quantitative analysis of the bibliographic features of a body of literature." Sengupta (1920) explained bibliometrics as "Organisation, classification, and quantitative evaluation of publication patterns of all macro and micro communications along with their authorship by mathematical and statistical calculus."(Sengupta, 1990).

A bibliometric study can be applied to define general productivity in the given area, it can be used to measure and evaluate the productivity of individual authors, journals, institutions, countries or any other levels of academic performance. Bibliometric studies can be done effectively if prior to carrying out any research, required data fields should be identified. For example, to study the pattern of journals, data fields include Title of the article, author names, affiliated institutions, number of citations received, references, types of references, subjects, etc. For institutional productivity, the academic

contribution/publications of academic community of that particular institution.

### 3 REVIEW OF RELATED LITERATURE

There are several studies available related to this area such as Velarde-Molina & et al. (2023) evaluated the studies in Education and reviewed with the bibliometric methodologies and found that 2021 identified the most productive year, English is the common language with the highest journals published from UK. Education in Science is the core area of research. Jain (2021) analysed the Journal of Indian Education published by NCERT for the period of five years 2014-2019 and found that single authorship is preferred with a 0.30 degree of collaboration. This paper also studied average length of articles and references. Pandey & Awasthi (2021) explored that 2019 was most productive year with an average growth rate of 8.77% per year and degree of collaboration of 0.52 % with maximum articles in collaboration. Bapte and Gedam (2019) analysed the 54 issues of SRELS Journal of Information Management for the year 2010-2018. Total 526 articles with 7690 citations. Joint authorship is preferred with 0.65 degree of collaboration. It also studied the average length of papers. Kumar, Mahendra (2014) studied Library Herald Journal from 2011 to 2014 and found that sole-author publication is preferred with 65 % of the total 114 articles with the highest contributors from India (89.47%).

### 4 NEED OF THE STUDY

IJET is a unique journal in the area of ICT in education along with its peripheral areas for all levels of education with specific reference to India. IJET completed its five years of journey with the completion of the fifth volume in the year 2023, so there is need to analyse the publication pattern of articles to spread the reflection on concentrated areas chosen by the authors for research on school and teacher education with the use of technology along with other various bibliometric aspects of journals and references.

### 5 SCOPE

This article will cover all issues of IJET during the period of five years i.e. 2019 to 2023 published by CIET, NCERT.

### 6 OBJECTIVES OF THE STUDY

The objectives of this study are as follows:

1. To study the year wise growth of publication in IJET during 2019-2023 along with annual growth rate
2. To study the varioustypes of articles published in IJET

3. To study the authorship pattern of the IJET
4. To study the collaboration pattern among authors
5. To study the distribution of length of pages per article in IJET
6. To find out the average no. of references per article
7. To study the types of references used in the published articles
8. To study the geographical distribution of articles published in IJET
9. To identify and mapping of subjects of articles published in IJET

## 7 METHODOLOGY

This is a quantitative study and data was retrieved from the NCERT website under the headings Journals and Periodicals downloaded from the link <https://ncert.nic.in/journals-and-periodicals.php>. Firstly, all the issues are downloaded and then print out taken for each article tile page along with reference details. Then Excel sheets were prepared for issue on various headings such as Title of article, Authors along with their designation and institution, subjects, authorship etc. MS Excel software is used to analyse all the objectives of the study.

The following formulas have been used in the calculations:

(a) The formula given by Kumar and Kaliyaperumal is used to calculate the Annual Growth Rate:

$$AGR = \frac{(\text{End Value} - \text{First value}) * 100}{\text{First value}}$$

(b) The formula given by K. Subramaniam(1983) is used to calculate the Degree of Collaboration (DC) is

$$DC = Nm / Nm + Ns$$

where,

Nm = Number of multi-authored articles (more than single author)

Ns = Number of Single- Authored articles

## 8 DATA ANALYSIS AND INTERPRETATION

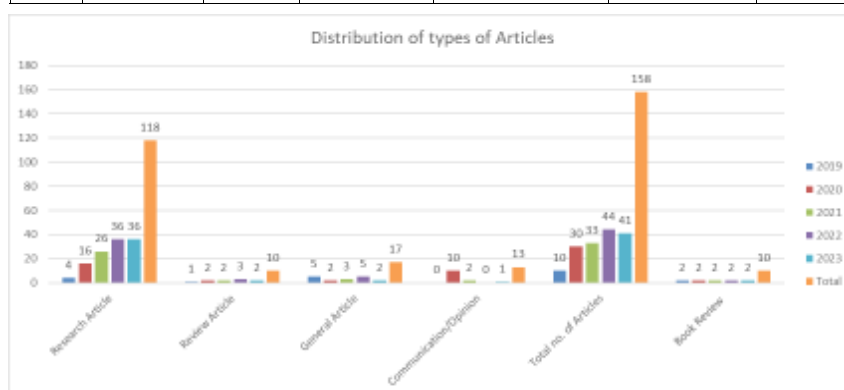
**TABLE 1***Year-wise distribution of Articles during the year 2019-2023*

<i>Issue Published</i>	<i>2019 (Vol. 1)</i>	<i>2020 (Vol. 2)</i>	<i>2021 (Vol. 3)</i>	<i>2022 (Vol. 4)</i>	<i>2023 (Vol. 5)</i>	<i>Total</i>	<i>%</i>
Issue 1(January)	4	9	10	20	20	63	39.87
Issue 2 (July)	6	21	23	24	21	95	60.13
Total no. of Articles	10	30	33	44	41	158	100
% (in percentage)	6.33	18.98	20.89	27.85	25.95	100	
Cumulative Total	10	40	73	117	158		
Annual Growth Rate (%)	-	200	10	33.33	-6.82		
Cumulative Growth Rate (%)	-	300	82.50	60.27	35.04		

The above table shows that in the beginning year, IJET brought its first volume with the publication of 10 articles and grew to the highest with 44 articles in the year 2022 which is the maximum during the period under study. Under study and followed by year 2023 with 41 article publications. However, it shows a continuous growth pattern except in the latest year 2023 with the difference of 3 articles. The annual growth rate showed an increase in publication by 200% from the beginning year i.e. 2019 to the year 2020 which is the highest among all years and it is down by 6.82 % in the year 2023. In these 5 years of data cumulative growth rate is highest in the year 2020 with a continuous decrease every next year. In the next table, details about different types of articles are mentioned along with book reviews.

**TABLE 2***Distribution of Types of Articles along with Book Reviews*

Year	Research Article	Review Article	General Article	Communication/ Opinion	Total no. of Publications	Book Review
2019	4	1	5	0	10	2
2020	16	2	2	10	30	2
2021	26	2	3	2	33	2
2022	36	3	5	0	44	2
2023	36	2	2	1	41	2
Total	118	10	17	13	158	10

*(Chart 1: Types of articles during 2019-2023)*

The above table & Chart depict that out of 158 articles, 118 are research articles and 17 are general articles. This journal also gives space to communications/opinions and review articles under specific headings in the

structure of the journal and published 10 review articles and 13 communications/opinions. Besides these, Book Reviews also found a place in each issue with one book review. A total of 10 book reviews were published in 5 years.

**TABLE 3**

*Authorship Pattern in IJET during 2019-2023*

<i>Year</i>	<i>Single Authored Articles</i>	<i>Joint Authored Articles</i>	<i>Three Authored Articles</i>	<i>Four Authored Articles</i>	<i>Five Authored Articles</i>	<i>Six Authored Article</i>	<i>Total no. of Articles</i>
2019	9	1	-	-	-	-	10
2020	18	10	1	-	-	1	30
2021	14	15	3	-	1	-	33
2022	13	28	2	1	-	-	44
2023	5	25	7	4	-	-	41
Total	59	79	13	5	1	1	158
	37.34	50	8.23	3.17	0.63	0.63	100%

Table 3 showed that Joint authorship took the share of 50 % with 79 publications of overall output of the journal and contained 59 articles in sole authorship with 37.34 % of the total contribution. 13 articles are written by 3 authors and 5 articles are four authored. One article in each category of five and six authored articles. Another important finding is that maximum number of articles i.e. 28 were published in joint authorship in the year 2022 and a maximum 18 articles were published in single authorship in the year 2020.



**TABLE 4***Collaboration pattern and degree of collaboration*

The above table 4 clearly shows that a total of 99 articles have been written in joint/ multi-authorship and 59 are single-authored articles. K. Subramaniam's (1983) formula is used to measure (Degree of Collaboration) and found that there is a continuous trend of growth year by year from 0.10 to 0.87 with increase in collaboration in writings from 10 % to 87%. The overall degree of collaboration is 0.63 which depicted that authors preferred to write in joint or more than two authors.

S.No	Year	Single Authored Articles	St (Col A
1	2019	9	
2	2020	18	
3	2021	14	
4	2022	13	
5	2023	5	
	Total	59	

**TABLE 5***Year-wise distribution of length of pages of Articles published in IJET*

<i>Year</i>	<i>1-5</i>	<i>6-10</i>	<i>11-15</i>	<i>16-20</i>	<i>21-25</i>	<i>No. of Articles</i>	<i>Total No of pages of Articles</i>	<i>Cumulative No. of pages</i>	<i>Average No. of Pages per Article</i>
2019	-	5	5	-	-	10	110	-	11.00
2020	9	6	10	4	1	30	299	409	9.97
2021	1	11	14	7	-	33	418	827	12.67
2022	-	15	25	4	-	44	523	1350	11.89
2023	1	11	19	9	1	41	506	<b>1856</b>	12.34
Total	11	48	73	24	2	158	1856		11.75

The above table shows that a total of 1856 pages is used for 158 articles. It does not include the preliminary pages, book reviews and list of editors. The length of articles ranges from 09 to 13 pages. However, two articles are published with more than 20 pages in research article category with 21 pages in the year 2023 July issue, and review article category with 22 pages in the January issue of 2020. One important observation is communications are maximum in 1-5 range of pages.

**TABLE 6***Total No. of References in Articles published in IJET*

<i>Year</i>	<i>Total No. of References in volume 1</i>	<i>Total No. of References in volume 2</i>	<i>Total No. of References of Articles</i>	<i>Total No. of Articles in Year</i>	<i>Average number of References per Article</i>
2019	76	129	205	10	20.50
2020	274	296	570	30	19.00
2021	200	476	676	33	20.48
2022	449	542	991	44	22.52
2023	396	537	933	41	22.76
Total	1395	1980	3375	158	21.36

A total of 3375 References have been used in 158 articles ranging from 19 to 23 numbers. The average number of references per article is calculated as 21 approx. In the next table the details of different types of references are classified in the following categories:

**TABLE 7***Types of References Used in the Published Articles*

<i>Types of References</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>	<i>2023</i>	<i>Total</i>	<i>%</i>
Articles	71	262	307	724	582	1946	57.66
E-Resources	63	116	152	77	100	508	15.05
Books	32	120	103	79	92	426	12.62
Reports	18	23	59	48	68	216	6.40
Conference Paper	03	20	11	29	63	126	3.73
Theses	01	26	17	9	09	62	1.84
Newspapers/Magazines	01	-	19	16	12	48	1.42
NEP/NCF	11	2	08	08	06	35	1.04
Dictionary/Encyclopaedia	05	01	0	01	01	08	0.24
Total	205	570	676	991	933	3375	

**TABLE 8***Geographical distribution of articles published in IJET*

S.No.	State/UTs/other specific categories	2019	2020	2021	2022	2023	Total
1	Andhra Pradesh	-	2	1	1	1	5
2	Arunachal Pradesh	-	-	-	-	2	2
3	Assam	-	1	-	2	-	3
4	Bihar	-	1	-	1	1	3
5	Chhattisgarh	-	-	-	1	-	1
6	Gujarat	-	4	2	1	2	9
7	Haryana	1	-	1	1	4	7
8	Himachal Pradesh	-	-	-	-	1	1
9	Jharkhand	-	-	1	1	-	2
10	Karnataka	-	-	1	2	1	4
11	Kerala	-	-	2	3	2	7
12	Madhya Pradesh	-	2	-	-	-	2
13	Maharashtra	1	4	5	1	-	11
14	Meghalaya	1	1	-	1	2	5
15	Mizoram	-	-	-	1	-	1
16	Nagaland	-	-	-	-	1	1
17	Odisha	-	-	-	5	-	5
18	Punjab	-	-	1	4	-	5
19	Rajasthan	1	-	-	-	1	2
20	Sikkim	-	-	-	-	1	1
21	Tamil Nadu	-	3	2	3	4	12
22	Telangana	-	-	1	-	-	1
23	Uttar Pradesh	-	1	2	2	4	9
24	West Bengal	-	-	1	4	1	6
25	Delhi	6	9	10	7	9	41
26	Jammu & Kashmir	-	-	-	1	3	4
27	Puducherry	-	-	1	1	-	2
28	Not Specified(State/UT)	0	1	1	1	-	3
29	International	-	1	1	-	1	3
	Total	10	30	33	44	41	158

In the above table, types of resources are used while writing articles. The highest used form is articles with more than 57.66 % i.e. 1946 articles followed by usage of e-resources with 508 (15.05 %) of total references altogether in various formats which includes the sources with proper bibliographical details along with weblinks, direct website links of resources and multimedia resources (video/films/online session etc.). 426 books have been cited which also includes 45 edited books and reports also secured 4<sup>th</sup> place with 216 citations, specifically 36 UNESCO reports. 62 theses are consulted which shows that authors are making use of grey literature available in various formats. National Education Policies (NEP) and National Curriculum Framework (NCF) were also referred 35 times in 158 articles.

Above table describes about the authors who contributed from different geographical areas of India. While evaluating it has been observed that there are 3 foreign contributors from Indonesia, USA and Zambia which enhances the scope and popularity of the journal all over the world. It is noticed that the maximum no of authors belongs to Delhi with 41 article publications followed by Tamil Nadu and Maharashtra with 12 and 11 contributions respectively. Gujarat and Uttar Pradesh have the same no of articles i.e. 9 publications.

**TABLE 9**

<i>Subjects</i>	<i>Number of Articles</i>
Information and Communication Technology (ICT) in education	31
Online courses for school and teacher education	17
Technological integration into pedagogy and content	13
Flipped classroom, virtual and augmented reality, artificial intelligence, robotics and education	11
Impact of technology in education	10
Education Technology (ET)	9
Audio-video and multimedia in education and their issues	8
Technology support for differently-abled population	7
Digital games, toys, simulations, digital books and education	7
Distance education and technology	6
Open Educational Repositories (OER) and FOSS	6
Impact of technology on learning	5
Educational Technology in smart governance and delivery of digital contents	5
Learning through social media	4
Technology cognition and curriculum	3
Nature of technology and learning	3
Mobile learning	3
Social media and children	3
Socio-psychological, ethical dimensions of technology and technological transfer	3
Computer-based learning	2
Technology assisted evaluation systems	2
Total	158

### *Subject-wise distribution of Articles*

The above table explains the subjects/areas on which articles were written. As analysis of subject totally depend on the understanding and knowledge capacity of the researcher. However, the subjects are assigned to each article based on the themes specified and given in the IJET. Although each article is having several components and overlapping of subjects but subjects are assigned based on the content of the article. Table 9 showed that the strongest areas are ICT in education is the top and broadest heading under which 31 articles are covered followed by Online courses for school and teacher education with 17 articles and Technological integration into pedagogy and content with 13 articles. 11 articles under the theme of Flipped classrooms, virtual and augmented reality, artificial intelligence, robotics and education. However, as per the themes mentioned in the journal, there is a need to study the Innovation in educational system, Economics of technology and its impact on education system and educational planning administration and technology.

## 9 MAJOR FINDINGS

This bibliometric study of 158 articles of IJET has the following major findings:

1. 2022 is the most productive year with 44 publications followed by the year 2023 with 41 publications.
2. Out of 158 articles, 118 research articles, 17 general articles, 10 review articles and 13 articles were published under the communication/opinion category along with 10 book reviews.
3. Joint authorship is preferred over sole authorship with 79 articles and 59 articles respectively.
4. The overall degree of collaboration is 0.63 which depicted that authors preferred to write in joint or more than two authors
5. Total 1856 pages are used for 158 articles and average length of articles is 11 (approx.) pages. Two articles are found of more than 20 pages with another finding that communications are maximum in 1-5 range of pages.
6. Total 3375 References have been used in 158 articles and average number of references per article calculated as 21 approx.
7. Highest used form of references is 'Articles' with more than 57.66 % i.e. 1946 articles followed by e-resources with 508 citations (15.05 %) of total references.
8. As per geographical distribution, Delhi secured first place with 41 articles followed by Tamil Nadu and Maharashtra with 12 and 11 contributions respectively. 3 foreign contributors are from Indonesia, USA and Zambia.

9. ICT in education is the most concentrated subject with 31 articles followed by Online courses for school and teacher education with 17 articles and Technological integration into pedagogy and content with 13 articles.

## 10 CONCLUSION

Indian Journal of Educational Technology has a wide coverage of all the concepts of ICT application in education especially for school education and teacher education. However, it also covers higher education studies. This analysis showed that research scholars, faculty members, administrators, consultants, and other professionals contributed their research papers and experiences in understandable language. IJET has gained a lot of popularity in a short span among the academic community for its timely publication, scope of coverage and availability in open access format. IJET is a regular and reputed journal publication of NCERT in the area of Educational Technology.

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