



## Authorship Patterns in Engineering Education

Yahya Ibrahim Harande  
Bayero University, Department of Library  
and Information Sciences, P.M.B.3011  
(Kano, Nigeria)  
{yaibrahimah@yahoo.com}

---

### ABSTRACT

*This paper examines authorship patterns in Engineering Education literature from 2000 to 2008. The International Journal of Engineering Education was used as the database for the study. The result shows that collaboration activities dominated the literature (73%). The highest collaboration coefficient was found to be (0.81). The aspect of International collaboration was emphasized, and 64 countries were found to have participated. The proportion of male (81.1%) and female authors (18.1%) was determined, and the gender composition of research groups was also outlined. Looking at the number of international collaboration participants, one could argue that research activity connects scientists across nations and continents.*

Received: 1 September 2023

Revised: 2 November 2023

Accepted: 19 November 2023

Copyright: with Author(s)

**Keywords:** Authorship patterns, engineering education, literature, Bibliometrics

---

### 1. Introduction to Remote Access and Methods

*Authorship in scientific research entails the contribution of a single person or multiple persons towards the production or perfection of a work worthy of publishing or sharing among scientists. Smith and Williams-Jones (2011) said, "Some research contributions may be intellectual, such as the creation or design of the project, while others will be more technical, such as the creation of a new reagent or software; both types of contribution may be legitimately important, and so warrant authorship." Knowledge sharing among scientists is important and fundamental to the development, growth and acceptance of any form of scientific research. Dehaan (1997) opined that "Scientists need each other to develop ideas, to discuss their research, to divide the burden of routine work and so on. Some scientists have a strong influence on the work of others." In this digital age, scientists globally could be considered an entity whenever information, knowledge and research findings are shared. Persson et al. (1997) hold the view that "The communication of research findings is therefore fundamental to any scientific endeavour, and scientists are constantly engaged in the mutual exchange of information and knowledge." Cooperation among scientists in communicating useful information concerning research findings enhances collaboration and greatly assists in solving complex scientific issues. Sonnenwald (2007) expressed a similar view: "Scientific collaboration is increasing in frequency and importance. It has the potential to*

solve complex scientific problems and promote various political, economic and social agendas, such as democracy, sustainable development and cultural understanding and integration. Bibliometrics studies over the past two decades have shown a continuous increase in the number of co-authored papers in every scientific discipline, as well as within and across countries and geographic areas."

Furthermore, Cho, Hu and Liu (2010) said, "Advancements in science and technology are no longer confined to the scientific advancements of individual nations and indeed, the focus in many journals is now on collaboration and coauthorship, both of which are currently on an upward trend. Collaboration or joint research allows the exchange of tacit knowledge among scientists and scholars." Similarly, Rey-Rocha, Mertin-Sempere and Garzon (2002) believe that "It can be assured that teamwork, collaboration and interdisciplinarity are some of the principal characteristics of modern science. Team stability and cohesiveness play a key role in determining research patterns, productivity and successful performance of scientists." Cunningham and Dillon (1997) further reiterated, "Traditionally collaboration occurs through face-to-face meetings, telephone, postal correspondence, it is likely that email and other internet-based communication modes also see significant use, given the naturally high degree of computer literacy in the field."

" This paper examines patterns of authorship in engineering education literature. The International Journal of Engineering Education serves as a bridge that connects two disciplines: engineering and education. It is assumed that all the articles in this journal will fall within the two disciplines. Three aspects of authorship were considered for this study they are (a) The extent of collaborative authorship, (b) International collaboration and (c) the Gender patterns of authors."

## 2. Single Journal Study

The idea behind a single journal study, using bibliometrics methods, is to x-ray the journal and bring out the hidden information that could be useful to scientists, information workers and general users of the particular journal. Multiple journal studies may not give details about a journal's performance. The current trends in bibliometrics research support single journal study. Anyi et al. (2009) opined, "When a single journal is studied bibliometrically, it creates a portrait of the journal, providing a description that offers insight beyond the superficial. It can indicate the journal's quality, maturity and productivity in any field, in a country or region. It also informs us about the research orientation it supports to disseminate and its influence on the author's choice as a channel to communicate or retrieve information for their research needs." The in-depth study, knowledge, information and understanding of a journal output could be reached quantitatively when bibliometrics methods are applied. Anyi et al (2009) conclude by outlining the in-depth knowledge that can be exhibited from single journals whenever bibliometrics methods are applied. They are as follows: - "Article productivity, author characteristics, authors' productivity, co-authorship patterns, content analysis, citation analysis and characteristics of the editorial board."

Many studies on single journals focus on different disciplines and subject areas. Goldenberg (2006) based his study on the Journal of Music Theory, Kaur (2006) studied the Malaysian law journal, and Rao and Bhusan (2008) compared the Journal of the American Society for Information Science and Technology (JASIST) with Scientometrics. Hussain and Fatima (2010) analyzed Chinese librarianship: an international electronic journal bibliometrically and found that "Single authors contributed the majority of articles. And most authors were librarians, faculty members or researchers affiliated with academic or research institutions." Similarly, the author (2011) studied the Library Herald Journal and drew the conclusion that "Researchers preferred journal articles more frequently for their research than any other type of communication channels." Warraich and Ahmad (2011) analyzed the Pakistan Journal of Library and Information Science and found that "Authors from the University of Punjab contributed maximum papers followed by the University of Karachi."

Another study conducted by Thanuskodi (2010) in the Journal of Social Sciences concludes that "The highest number of articles has appeared in the area of economics. Most of the contributions are from foreign 78.39% while Indian contribution is less." In addition to this, Crawley-Low (2006) conducted a study in the American Journal of Veterinary Research and found that "The majority of items cited were journals 88.8%. A core collection of veterinary medicine journals from zone 1 and zone 2." Rethlefsen and Wallis (2007) used the American Journal of Public Health in their bibliometrics studies. They drew the conclusion that "Knowing which titles are the most critical can help decision-making in smaller libraries or help librarians develop collections for public health professionals and

the zone 1 title in the current study may serve as one useful aid for informing and substantiating such decision processes.” Tsay (2011) examined the Journal of Information Science and found, “Journal articles are the most cited documents, followed by books and book chapters, electronic resources and conference proceedings respectively.”

### 3. Method

A bibliography was compiled manually from the printed version of The International Journal of Engineering Education. The journal is considered one of the most popular journals in engineering education globally. It is consistent in publishing activity and publishes from all the nooks and corners of the world. These qualities contributed towards the choice of the journal for this study. The range of the years covered for the study was from 2000-2008. Papers published in this range of years were examined using Bibliometrics techniques to explore the number of authors per paper, year of publishing, international collaboration and gender of authors. Manual counting of authors to examine their collaborative nature was employed. Years of publishing of papers were also counted and recorded. The extent of International collaboration among the contributing authors was also examined and recorded. On the gender of authors, a brief biography on each of the authors is given at the end of each article. This information assisted greatly in generating a comprehensive list of authors along their gender lines.

### 4. Findings and Discussion

#### 4.1. The year-wise Pattern of Authorship

A total of 1016 papers (Table 1) were published during the nine years of the study (2000-2008). The authorship pattern in the literature started experiencing significant growth in 2003. The highest collaboration coefficient of 0.81 ([100/123]) was recorded in 2008. The essence of a year-wise study is to investigate the details of the growth of the literature. This assists in giving information that could be accurate and reliable. The year-wise information allows for comparison to exhibit the year that records the highest growth of the literature. Patterns of authorship within the study period could be established through proper evaluation of the year-wise information on the spread and growth of the literature. Collaborative works are beginning to take centre stage in the dissemination of the literature on engineering education. One can easily discern from the result of the study that 2008 turned out to be leading in collaborative activities.

<b>2000</b>	26	37	63	0.58
<b>2001</b>	32	46	78	0.58
<b>2002</b>	31	60	91	0.65
<b>2003</b>	36	79	115	0.68
<b>2004</b>	40	102	142	0.71
<b>2005</b>	27	99	126	0.78
<b>2006</b>	35	113	148	0.76
<b>2007</b>	27	103	130	0.79
<b>2008</b>	23	100	123	0.81
<b>Total</b>	277	739	1016	0.72

Table 1. Year-wise pattern of authorship

- Key;
- SAP-Single author papers

- MAP-Multiple author papers
- T-Total
- CC – Collaboration co-efficient

#### 4.2. International Collaboration

There were 64 entries on collaboration activities among countries from different continents. This clearly shows that collaborative research in engineering education transcends various continents worldwide. The United States of America collaborated with other countries and produced 482 research studies (Table 2). Spain emerged second with 53 papers, the United Kingdom became third with 45 papers, Canada took fourth with 44 papers, and Australia won fifth with 39 papers. The least collaborative research among the participating countries was between one country and another; 24 countries were found to have collaborated with one other country. This finding further confirmed the assertion that geographical location enhances collaboration among scientists. Choi (2012) explained, "Most previous studies agreed that geographical, economic, and linguistic factors are significant in explaining international scientific collaboration, irrespective of different co-authorship indices, study periods, and countries analyzed."

Country	Frequency
United States	482
Spain	53
United Kingdom	45
Canada	44
Australia	39
China	23
Singapore	20
Turkey	19
New Zealand	17
Israel	13
Sweden	12
Germany	10
Malaysia	10
Lebanon	10
Netherland	09
Portugal	09
South Africa	08
Slovenia	07
Taiwan	06
Mexico	06
India	06
Denmark	06
Switzerland	05
Ireland	05
Kuwait	04
Greece	04

Sri Lanka	04
Italy	04
Japan	03
Cyprus	03
Iran	03
Croatia	03
Finland	03
Oman	03
Austria	03
Brazil	02
Norway	02
Chile	02
Lithuania	02
Jordan	01
Mauritius	01
Saudi Arabia	01
Czech	01
Botswana	01
France	01
Egypt	01
Philippines	01
Nigeria	01
Argentina	01
Sao Paolo	01
Palestine	01
Venezuela	01
Romania	01
Trinidad and Tobago	01
Bahrain	01
South Korea	01
Zimbabwe	01
Indonesia	01
Norway	01
Columbia	01
Pakistan	01
Burma	01

**Table 2. Ranking of participating countries**

### 4.3. Gender of Authors

Information on the gender of authors in engineering education further exhibits the major contributors towards the growth and development of the field. This idea is not only peculiar to this literature, but it has been the tradition practised in scientific disciplines. Katrina (2002) opined, "Sex differences in publication productivity have also been empirically established in other socio-cultural contexts and scientific communities." The gender of authors that contributed journal articles in this literature was recorded, and this could be determined for 1016 papers, with 2529 authors. Male authors dominated the scene (Table 3) with 81% of contributions throughout the study. Furthermore, in trying to know whether both males and females have the same communication pattern in terms of collaboration and co-authorship in the literature, a thorough checking was conducted. The result (Table 4) indicated that the percentage of male authors who published a single authored paper in the literature is 11.50% ([238 male single authors] / [2069 male authors]); the percentage of female authors who published solo articles in the literature is 8.04% ([37 single author females] / [460 female authors]). The percentage of male-only collaborated papers is 6.26% ([432 / 2069]), while the percentage of female authors who published in female-only teams is 5.65% ([ 26 / 460 ] ). Clearly, one could say that the pattern of co-authorship of both male and female authors in the literature has a similar trend of development.

Gender	Number	Percentage
Male	2069	81.8
Female	460	18.1

Table 3. Gender of Authors

	SMA	MMA	SFA	MFA	MAMF
No.	238	432	37	26	263
%	23.9%	43.3%	3.7%	2.6%	26.4%

Table 4. Gender groups of publishing teams

- Key;
- SMA-Single male authors
- MMA-Multiple male authors
- SFA-Single female authors
- MFA-Multiple female authors
- MAMF-Multiple authors, male and female

### 5. Conclusion

The authorship patterns in engineering education literature have shown significant development in co-authorship. The literature demonstrates the universality of co-authorship among scientists in various fields of engineering education. A total of 64 countries participated in the collaborative research on this subject. This number is substantial enough to conclude that the International collaboration and co-authorship trend is highly pronounced in the literature. The gap between male and female-only authors is not very wide. Female authors in this literature could be said to have recorded a significant contribution towards the growth of the literature through team research. Therefore, the development trend in this aspect, between the male and female, seems to be similar.

## References

- [1] Anyi, K. W. U., Zainab, A. N., Anwar, N. B. (2009). *Bibliometric studies on single journals: a review Malaysian journal of library and information science*, 14(1), 17-55.
- [2] Cho, C., Hu, M., Liu, M. (2010). Improvements in productivity based on co-authorship: a case of published articles in China. *Scientometrics*, 85, 463-470.
- [3] Choi, S. (2012). Co-periphery, new clusters, or rising stars? international scientific collaboration among 'advanced' countries in the era of globalization. *Scientometrics*, 90(1), 25-41.
- [4] Crawley-Low, J. (2011). Bibliometric analysis of the American journal of veterinary research to produce a list of core veterinary medicine journals. *Journal of medical library Association*, 94(4), 430-4334.
- [5] Cunningham, S. J. O., Dillon, S. M. (1997). Authorship patterns in information systems, *Scientometrics*, 39(1), 19-27.
- [6] De Haan, J. (1997). Authorship patterns in Dutch sociology. *Scientometrics*, 39(2), 197-208.
- [7] Goldenberg, Y. (2006). Journal of music theory over the years: content analysis of the article and related aspects. *Journal of music theory*, 50(1), 25-63.
- [8] Hussain, A., Fatima, N. (2010). A bibliometric analysis of the Chinese librarianship: an International electronic journal. *Chinese librarianship: an international electronic Journal*, 31. Available at. <http://www.iclc.us/cliej/cl3/HF.pdf>
- [9] Katrina, P. (2002). Gender and productivity differentials in science. *Scientometrics*, 55(1), 27-58.
- [10] Kaur, H. (2006). Bibliometric study of Malaysian law journal articles. *Legal information management*, 6, 49-54.
- [11] Persson, D., Melin, G., Danell, R., Kaloudis, A. (1997). Research collaboration at Nordic Universities. *Scientometrics*, 39(2), 209-223.
- [12] Rao, R., Bhusan, S. B. (2008). Distribution of multiple authors in two journals (JASIST & Scientometrics) and in the subject of software studies: A case study. Available at. <http://www.collnet.de/Berlin-2008/RaoWIS2008dma.pdf>
- [13] Rethlefsen, M. L., Wallis, L. C. (2007). Public health citation patterns: an analysis of the American journal of public health, 2003-7 2005. *Journal of medical library Association*, 95(4), 408-470.
- [14] Rey-Rocha, J., Mertin-Sempere, M. J., Garzon, B. (2002). Research productivity of scientists in consolidated vs. non-consolidated teams: The case of Spanish university geologists. *Scientometrics*, 55(1), 137-156.
- [15] Smith, E., Williams-Jones, B. (2011). Authorship and responsibility in health science research: a review of procedures for fairly allocating authorship in multi-author Studies. *Science and Engineering Ethics*, 1-14.
- [16] Sonnewald, D. H. (2007). Scientific collaboration, In: Annual review of Information science And Technology, edited by Blaise Cronin, 41, 643-682. *Scientometrics*, 20(3), 417- 426.
- [17] Thanuskodi, S. (2010). Journal of social sciences: A bibliometric study. *Journal of social Sciences*, 24(2), 77-80.
- [18] Thanuskodi, S. (2011). Library herald journal: A bibliometric study. *Journal of arts and Science and commerce*, 2(4), 68-76.

[19] Tsay, M. (2011). A bibliometric analysis on the journal of information science. *Journal of Library and information research*, 5(2), 1-28.

[20] Warraich, N. F., Ahmad, S. (2011). Pakistan journal of library and information science: A Bibliometric analysis. *Pakistan journal of library and information science*, 12. Available at. <http://pu.edu.pk/home/journal/8>