Open Access Journals in Mathematics: A Study based on Directory of Open Access Journals (DOAJ)

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Abstract

This study aims to perform a quantitative analysis of open access journals in the field of Mathematics that are included in the Directory of Open Access Journals (DOAJ), an index that includes more than 18,206 peer-reviewed journals in all fields of knowledge published by 130 nations in 80 languages. According to the survey, 228 journals, or 1.25 percent, publish articles relating to Mathematics out of the 18,206 open access journals that the DOAJ indexes as of September 19, 2022. The Indonesia 35(15.35%) and United Kingdom 30(13.16%) are the top two countries publishing the most open access journals in Mathematics. Out of 228 journals, 192 (84.21%) are published in the English language. Journals adhere to Creative Common licencing in 260 (97.94%) of cases. While 128 journals (56.14%) limit the authors' ability to hold full copyright, 100 journals (43.86%) do not. Publishers of open access journals in Mathematics favoured‘Blind Peer Review’ as 125 journals (54.82%) followed this system followed by ‘Double Blind peer review’ by 65 journals (28.51%), ‘Peer review’ by 34 journals (14.91%). Open peer review” was followed by each 4 journals (1.75%).

Keywords: Open Access; Open Access Publishing; Open Access Journals; Mathematics; Maths; Mathematical Journals; DOAJ.

Introduction

The advent of the Internet aided in the creation of open access (OA), which describes unrestricted online access to articles published in scholarly journals and other types of publications, book chapters, monographs, etc. Due to the distribution being largely done online, readers can read,

Mathematics exposes underlying patterns that aid in our comprehension of the world. Mathematical models of natural phenomena, human behaviour, and social systems are all included in the discipline of mathematics today, which is much more than just addition and subtraction. It also deals with measurements, observations, and data from science, as well as inference, deduction, and proof. Human life depends on interdependence because man is a social species. Work in groups improves social skills. The capacity to collaborate with others on activities helps develop a variety of social skills. Because of the give and take process, commerce and industry need on mathematical understanding in order to function in social situations. Only mathematics can be credited with the change in social structure brought about by contemporary conveniences like transportation, communication, and advances in science and technology. In this sense, arithmetic has been crucial to the development of society as well as to understanding social progress.

About DOAJ

The DOAJ (Directory of Open Access Journals) was established in 2003 with the goal of increasing quality, peer-reviewed, open access scholarly research journals' visibility, accessibility, reputation, usage, and effect on a worldwide scale, regardless of discipline, region, or language. There are around 12,200 open access journals that don't charge article processing fees and over 7 million publications that are available under open access. The DOAJ receives financial support from numerous libraries, publishers, and other like-minded organisations. The DOAJ is now the largest directory on the Internet where stakeholders in higher education and research can use top-quality peer-reviewed open access journals since it meticulously avoids predatory open access publications.

Review of Literature

Reddy A.N.M. (2021) did a quantitative study on 287 economic journals that were indexed in DOAJ and discovered that 78.75% of them do not impose article processing charges and that 87.11% of them have had a fall in growth rate since 2013. (APCs).

Rathinasabapathy and Veeranjaneyulu (2021) conducted a bibliometric analysis and found that as of 10 June 2021, DOAJ has indexed 16,460 open access journals, 335 (2.03%) of which were open access journals in veterinary and animal science. The 335 open access journals were produced by 63 different countries, with the United Kingdom leading the way with 41 journals (12.24%) and Indonesia coming in second with 35 journals (10.44%).

Objectives of the Study

The primary goal of the current research is to examine the publication patterns of scholarly open access journals in Mathematics that are listed in the Directory of Open Access Journals (DOAJ) using a variety of criteria, including

- To explore the open access journals publishing articles
- To examine the growth of open access journals
- To ascertain the leading countries publishing open access
- To explore the language distribution of OA journals
- To discover the licensing models of open access Mathematicsjournals
- To identify the copyright privileges of the authors who published articles in the open access journals
- To find out the peer-review policy adopted by the OA journals
- To examine the plagiarism policy of the OA journals
- To identify the OA journals in Mathematics which are collecting and not collecting Article Processing Charges (APC)
- To know the time taken from ‘submission to publication’ by the OA journals

Scope and Limitation of the Study

The current study was carried out using information from the Directory of Open Access Journals (DOAJ) regarding open access journals in the discipline of mathematics as of September 17, 2022. The entire Internet is not examined. Because of this, the numbers do not accurately reflect the

actual number of open access scholarly publications in Mathematics and only incl
are indexed in the DOAJ.

Methodology

All journal data were downloaded as a CSV file from the Directory of Open Access Journal (www.doaj.org) on September 17, 2022. The CSV file contained all of the details for the 18206 journals that the DOAJ had indexed as of September 17, 2022. The DOAJ assigns up to six keywords to each journal title.The six keywords were consequently organised alphabetically in a separate CSV file. Then, titles that applied to any field of mathematics were taken out. A total of 325 records were collected after the duplicate records were removed. Finally, 228 unique titles were discovered that publish papers regarding mathematics and related areas. To create results in line with the targeted objectives of the current study, the data were then shown in tabular format using MS-Excel.

Growth of OA Journals in Mathematics

According to the survey, 228 journals—or around 1.25% of all journals—publish articles about various elements of mathematics out of the 18,207 journals that the DOAJ has indexed. In 2003, the first journal was indexed, and one more journal was added. Only 57 journals (25.00%) were added in the first ten years, from 2003 to 2014, but 171 journals (75.00%) were added in the next nine years, from 2015 to 2022. 42 journals (18.42%) of all new publications, were added in 2021. The details are illustrated in Figure-1.

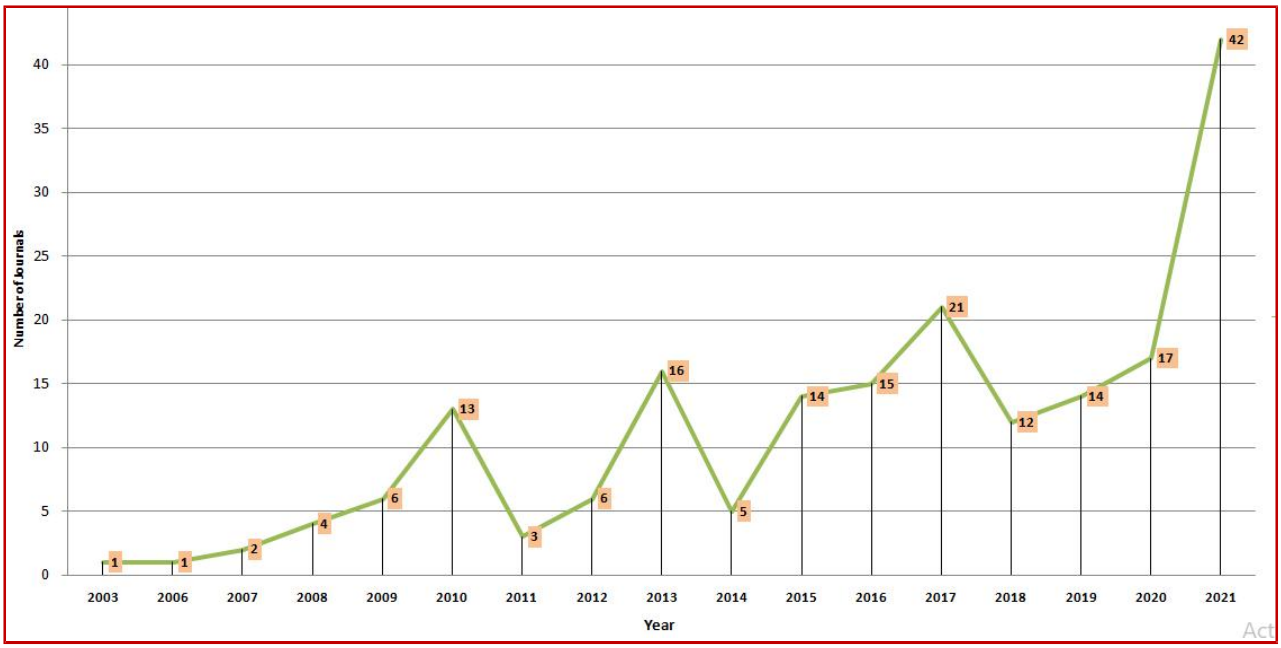

Figure.1: Growth of OA Journals in Mathematics

Leading Countries publishing OA Journals in Mathematics

The top country for publishing the most open access journals in mathematics is Indonesia, which has 35 titles (15.35%), followed by Switzerland (30 titles (13.16%), the United States 18 titles (7.89%), Poland 14 titles (6.14%), China 13 titles (5.70%), the Russian Federation 11 titles (4.82%), Romania 9 titles (3.95%), the Netherlands 6 titles, (2.63%), and France 5 titles, (2.19%). In Figure 2, the top 10 nations that publish a significant amount of open access journals in Mathematics are shown.

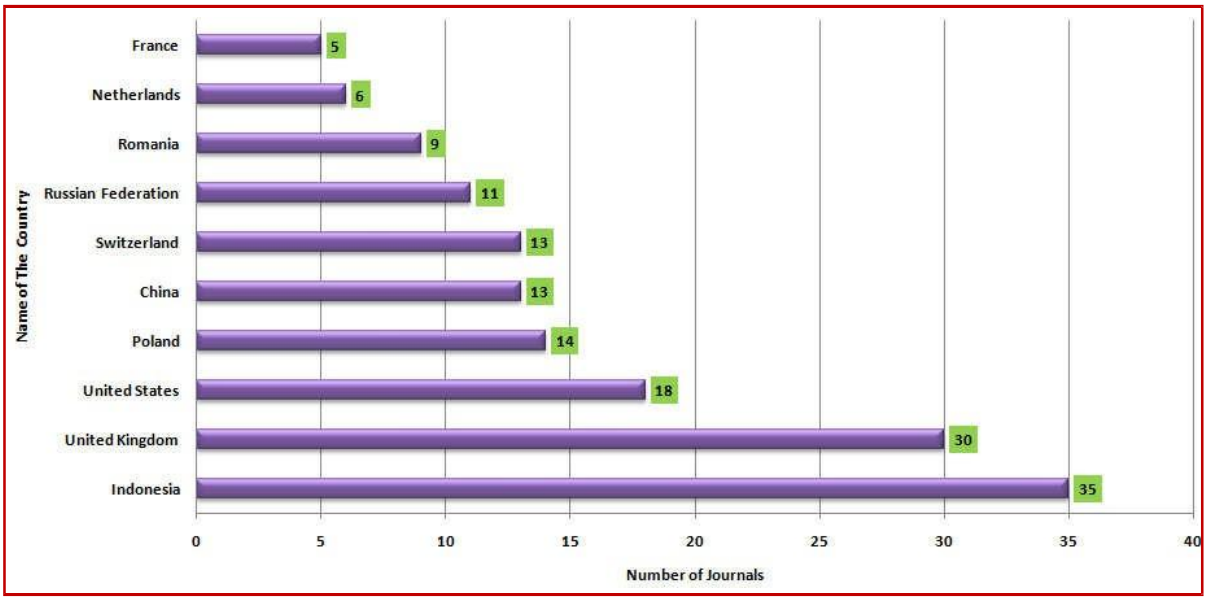

Figure.2: Top 10 countries publishing OA journals in Mathematics

Language distribution of OA Journals in Mathematics

Figure 3 demonstrates that 75.56% of the 192 open access journals in Mathematics are published in the English language. Figure 3 shows the top 10 languages in which the OA Mathematicsjournals are published.

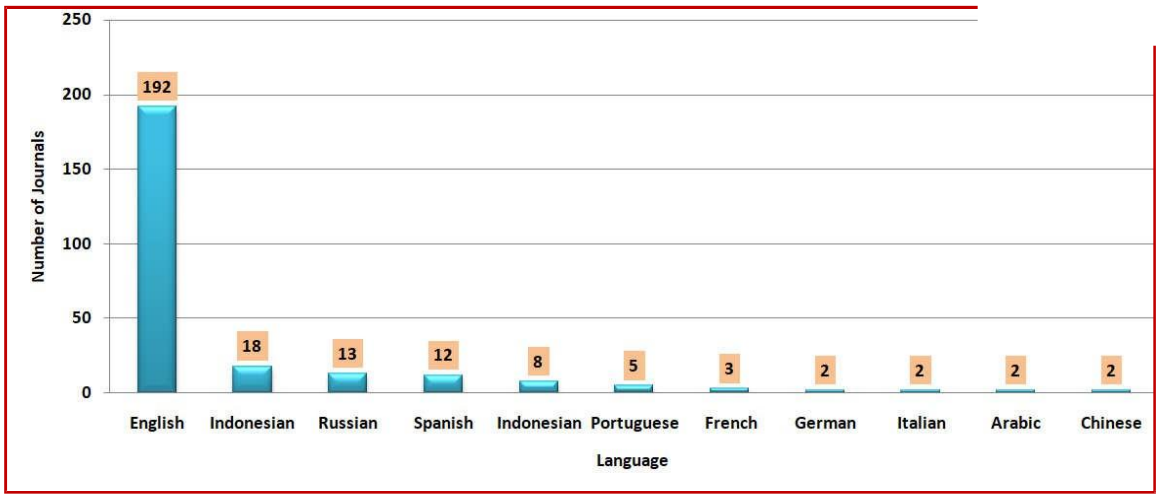

Figure 3: OA Journals in Mathematics- Top 10 Languages

License terms used by OA Journals Mathematics

The current study discovered that publishers typically utilise Creative Common licencing types; out of 228 journals, 97.74% used CC licencing types, while only 2.26% of journals used publisher's own licences. The DOAJ allows publishers to give licence information at the journal level. 52.63% of publishers use the Creative Commons BY licence, which permits users to share, remix, change, and build upon their works even for commercial purposes as long as they provide credit to the original author.The other types of creative common licences, such CC BY-NC, CC BY- NC-ND, CC BY-NC-SA, CC BY-SA, etc., are also widely used by publishers. Additional details on the various licencing options and necessary attributions are available on the website (https://creativecommonsusa.org/index.php/ufaqs/what-are-the-different-kind-of-cc-licenses/). The many licence types utilised by publishers of open access journals in mathematics are shown in Figure 4.

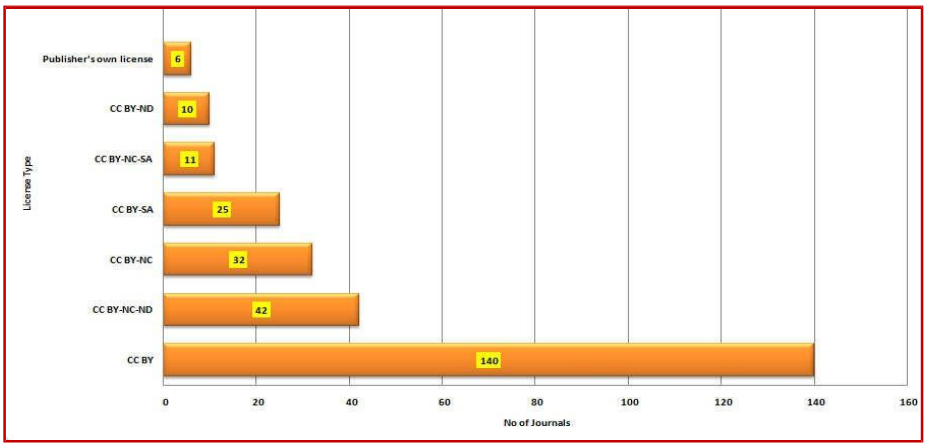

Figure-4 License types used by OA Journal Publishers

Copyright Privileges of Authors

Though the copyright for the paper actually belongs to the author, due to various financial strategies used by the publishing industry, authors frequently have to give the copyright to the publishers. While the majority of commercial publishers demand that authors relinquish their copyright to them, many open access journal publishers permit authors to maintain complete ownership of their work without doing so, supporting the information's free accessibility. 100 journals (43.86%) do not allow authors to retain the whole copyright, while 128 journals (56.14%) do, according to the current analysis. Figure 5 depicts the same scenario.

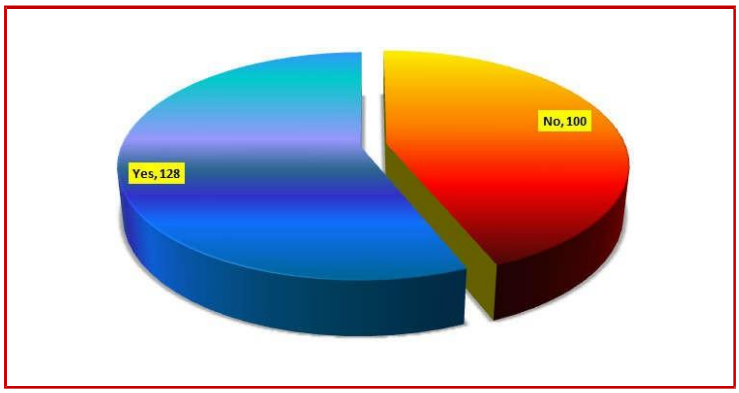

Figure-5. Copyright privileges of authors of OA Journals

Peer-review policy of OA Journals in Mathematics

Peer review is one of the crucial quality control procedures that publishers of scientific journals use to guarantee the calibre of the work. The publishers of journals use a variety of peer review systems. According to the current survey, OA journal publishers in mathematics favoured "Blind Peer Review," which was used by 125 journals (54.82%), followed by "Double Blind Peer Review," which was used by 65 journals (28.51%), and "Peer Review," which was used by 34 journals (14.91%). Each of the four journals (1.75%) preceded the phrase "open peer review." The details are illustrated in Figure-6

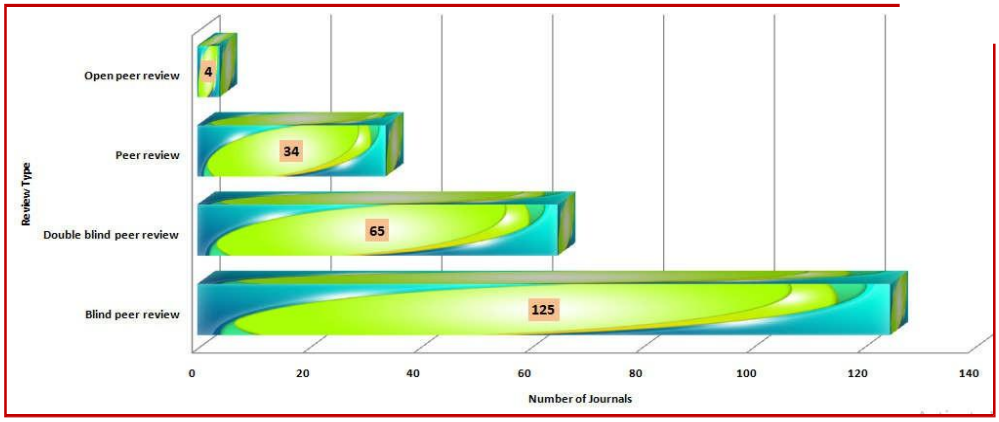

Figure-6. Peer review policy of OA Journals in Mathematics

Plagiarism policy of OA Journals in Mathematics

Plagiarism is the dishonest act of using another person's thoughts, strategies, products, or words without expressly attributing the author and source. Plagiarism is a big problem in academic publishing. As a result, most journal publishers now have a clear anti-plagiarism policy in place and use tools like Turnitin, Origin, etc. to determine how similar two pieces of writing are. On their websites, the anti-plagiarism policies of several journal publishers are very clear. According to the current investigation, 139 (60.96%) open access journals in mathematics had a clear policy against plagiarism, however 89 (39.05%) did not. Figure 7 provides an illustration of the details.

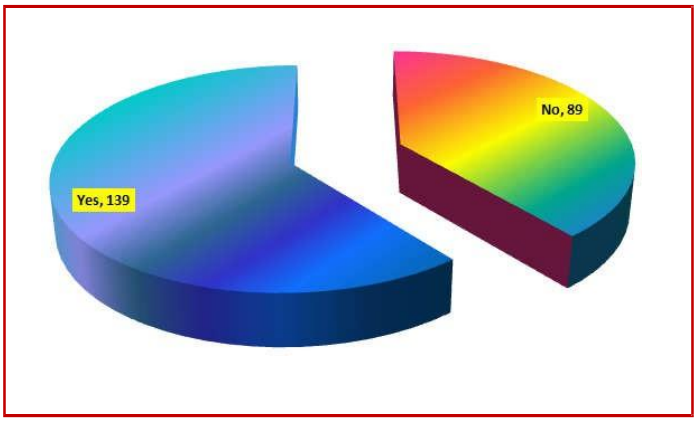

Figure-7 Plagiarism policy of OA Journals in Mathematics

Article Processing Charges (APC)

Several open access journal publishers used to charge authors "Article Processing Charges" to pay the costs of publication (APC). Many open access journal publishers, though, do not demand that their authors pay such an APC. According to the current analysis, the majority of open access (OA) journal publishers in mathematics, or 295 journals (46.92%), do not collect APC from authors, whereas 339 publications (53.47%) do. Figure-8 gives an illustration of the specifics.

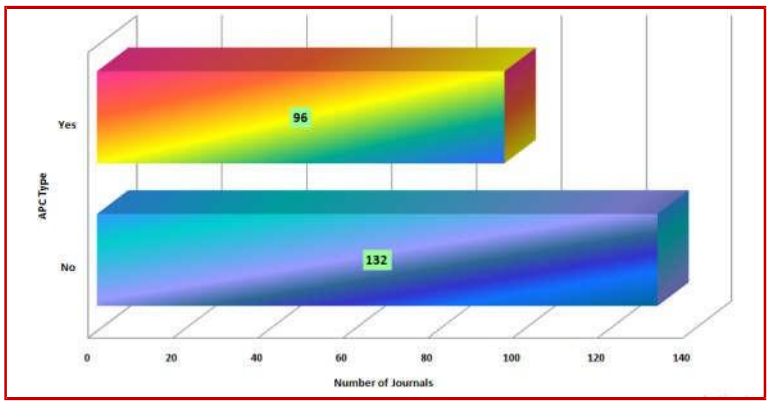

Figure-8 APC of OA Journals in Mathematics

Publication time taken by OA Journals in Mathematics

The time it takes for an article to be submitted and published is important since many academics and researchers select journals that publish articles quickly if they do so in order to advance their careers or for any other specific reason. Journal publishers frequently fail to provide the writers with this information. The vast majority of publishers currently provide this schedule on their websites.The current study found that 59 journals (25.87%) take between 5-8 weeks to complete, followed by 48 journals (21.05%) that take between 9- 12 weeks, 33 journals (14.47%) that take between 13-16 weeks, 21 journals (9.21%) that take between 17-20 weeks, and 18 journals (7.89%) that take between 21-24 weeks. It takes 2-4 weeks for 16 journals (7.09%). 07 journals (5.52%) take 25-28 weeks, 9 journals (3.07%) take 33-40 weeks, another 9 journals (3.07%) take 41–52 weeks, and so on. 4 journals (1.75%), according to the survey, took more than 52 weeks,another 4 journals (1.75%) takes More Than 52 weeks to publish JournalsFigure 9 provides an illustration of the details.

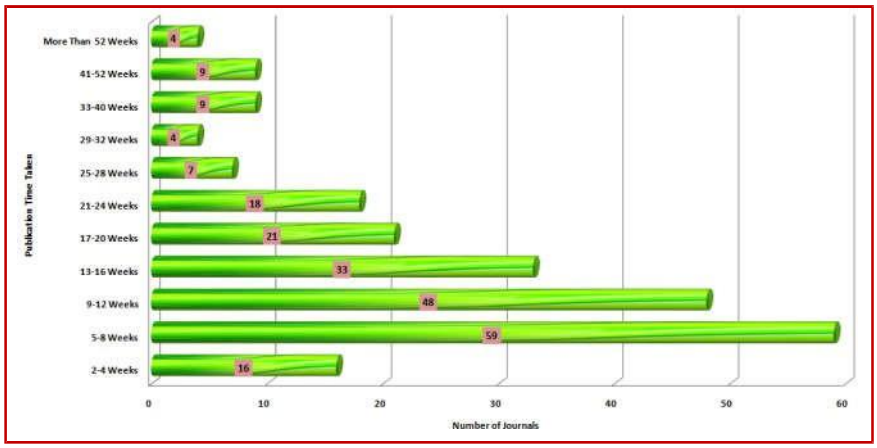

Figure-9 Publication time of OA Journals in Mathematics

Findings of the Study

- According to the survey, publications about various aspects of mathematics and related areas are published in 228 journals, or around 1.25% of all journals indexed by the DOAJ.
- In the first ten years, from 2003 to 2014, only 25.00% of journals were added; but, in the next nine years, from 2015 to 2022, 75.00% of journals were added. The greatest number of journals (18.42%) was added in 2021.
- The top two nations for publishing open access journals in mathematics are Indonesia 35 (15.35%) and the United Kingdom (30, 13.16%). Poland comes in second with 14 championships (6.14%), followed by China with 13 titles (5.70%), Switzerland with 11 titles (4.82%), the Russian Federation with 9 titles (3.95%), the Netherlands with 6 titles (2.63%), and France with 5 titles (2.19%). The DOAJ index only contains 1 journal from India; there aren't many open access journals from India included in the DOAJ.
- The majority of the 192 journals (84.21%) are published in the English language.
- Publishers frequently follow Creative Common licence agreements, as shown by the fact that, of the 260 journals evaluated, 97.74% did. 52.63% of journals, or the majority of publishers, use CC BY, a type of creative common licencing that allows individuals to remix, adapt, and build upon someone else's work even for profit as long as they provide credit to the original creator. A lot of publications also use the many creative common licence variants, including CC BY-NC, CC BY-NC ND, CC BY-NC-SA, and CC BY-SA.
- Only 128 journals (56.14%) enable authors to retain full copyright, whereas 100 journals (43.86%) do not.
- The current analysis found that 125 (54.82%) open access journals in mathematics preferred blind peer review, followed by 65 (31.33%) journals that used double blind peer review and 34 (14.91%) journals that used peer review. Open peer review is used by fewer journals.
- Among the 228 open access journals in Mathematics, 139 (60.96%) have a clear anti-plagiarism policy while 89 (39.03%) have not.
- Majority of OA journal publishers in Mathematics i.e 132 journals (57.89%) don’t collect APC from the authors while 96 journals (42.10%) collect APC.
- 59 journals (25.87%) take between 5-8 weeks to publish their articles, followed by 48 journals (21.05%) in 9-12 weeks, 33 journals (14.47%) in 13-16 weeks, 21 journals (9.21%) in 17-20 weeks, and 18 journals (7.89%) in 21-24 weeks. It takes 2-4 weeks for 16 journals (7.01%), 9 journals (3.94%) take 41-52 weeks, another 9 journals (3.94%) take 33-40 weeks, 7 journals (3.07%) take 25-28 weeks, 4 journals (1.75%) take 29-32 weeks, another 4 journals (1.75%) take Morethan 52 weeks and so on.

Conclusion

The Directory of Open Access Journals (DOAJ) index, which covers open access journals that have undergone quality control, includes journals related to mathematics. The information offered by the 228 journals covered by DOAJ in the field of Mathematics can be of great use to students, researchers, educators, scientists, and decision-makers. Many OA journals are still excluded even though the DOAJ has indexed many OA journals from many different disciplines. It is the obligation of library and information professionals to hunt out high-quality journals that are not indexed by DOAJ and to take the necessary steps to add them in order to enable effective use of such OA journals. Students, researchers, academicians, scientists, and decision-makers in the mathematics fields should find great value in the study's findings. Stakeholders in each subject covered by the Directory of Open Access Journals are also urged to consider conducting similar inquiries.

Because of its significance as the language of Science, Technology, and Engineering and its contribution to their advancement, mathematics has a "functional" element. This connection dates back to the beginning of mathematics, and it may be claimed that science and engineering cannot exist without mathematics. Modern times have seen a tremendous expansion in the use of mathematical techniques in the social, medical, and physical sciences. This has confirmed that math is an essential component of all school curriculum and increased demand for university-level mathematical training. A large portion of the demand is directly related to the requirement for statistical and mathematical modelling of phenomena. Such modelling is fundamental to all engineering, essential to the physical sciences, and has a big impact on biology, medicine, psychology, economics, and business.

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