

Rowan University

Rowan Digital Works

Libraries Scholarship

University Libraries

2-27-2023

An Investigation of Gold Open Access Publications of STEM Faculty at a Public University in the United States

Daniel G. Kipnis

Rowan University, kipnisd@rowan.edu

Denise Brush

Rowan University, brush@rowan.edu

Follow this and additional works at: https://rdw.rowan.edu/lib_scholarship



Part of the [Scholarly Communication Commons](#)

Recommended Citation

D.G. Kipnis, D.A. Brush. An Investigation of Gold Open Access Publications of STEM Faculty at a Public University in the United States. *Science and Technology Libraries*, 2023, DOI: 10.1080/0194262X.2023.2175103.

This Article is brought to you for free and open access by the University Libraries at Rowan Digital Works. It has been accepted for inclusion in Libraries Scholarship by an authorized administrator of Rowan Digital Works.

This article has been peer reviewed. It is the authors' final version prior to publication in:

Science and Technology Libraries

February 27, 2023, Pages 1-11.

The published version is available at:

DOI: [10.1080/0194262X.2023.2175103](https://doi.org/10.1080/0194262X.2023.2175103).

Copyright © [Taylor and Francis](https://www.tandfonline.com).

An Investigation of Gold Open Access Publications of STEM Faculty at a Public University in the United States

Daniel G. Kipnis and Denise A. Brush

Rowan University, Rowan University Libraries, Glassboro, NJ, USA

Email: kipnisd@rowan.edu and brush@rowan.edu

Campbell Library, Rowan University Libraries, Rowan University, Glassboro, NJ 08028–1700

Keywords: Gold Open Access, Open Access Publishing Fund, Engineering faculty, Science faculty, STEM publishers.

ABSTRACT

This study investigated Gold Open Access journal publication by science and engineering faculty at the authors' university from 2013 to 2022. Specifically, did Gold Open Access (OA) by these faculty increase, and did the publication rate vary between disciplines? The authors found that Gold OA publication increased by 176% over the past 10 years, and that an important factor was the Libraries' creation of an Open Access Publishing Fund in 2017. Disciplinary differences in publication rates were also notable, with life sciences research showing the highest rates of open access publication. An analysis of where our faculty are publishing found that MDPI is the most popular Open Access publisher in STEM fields, but many of the new Gold Open Access journals from traditional STEM publishers are also being chosen.

Introduction

Rowan University Libraries has actively promoted Open Access (OA) publication by the university's faculty since 2015, when the Libraries launched a Digital Commons Institutional Repository (IR). The original goal of promoting OA publication was to populate the institutional repository (IR) which only hosts full-text content authored by faculty and students, not links to paywalled content. As the Libraries leadership and the librarians learned more about the wider Open Access movement, a Scholarly Communication Librarian was hired in 2017 who continued to advance the university's understanding of this movement.

In June 2017, the Associate Provost for Libraries created an Open Access Publication Fund (OAPF) available to faculty for assistance in paying Article Processing Charges (APCs) for Gold

OA publication. To be eligible, articles must be accepted for publication in a peer-reviewed journal that is fully open access (not hybrid OA) and listed in the Directory of Open Access Journals. A copy of the article must be deposited in the IR. The fund was initially allocated \$20,000, with a maximum award per article of \$1500, and has increased over time to \$30,000 with a \$3,000 maximum.

Rowan University is focused on becoming a Carnegie class R1 (“Doctoral Universities with Very High Research Activity”) institution in the near future. Since the authors are both STEM (Science Technology Engineering Mathematics) librarians at this university, the authors decided to look at Gold OA publication by the university’s science and engineering faculty. The goal of our study was to see whether the focus on faculty education about Open Access has made a difference in their choice of publishing venues.

The authors’ hypothesis is that Gold Open Access publication by STEM faculty has increased since 2013.

Our research questions were:

1. Has Gold Open Access publication by STEM faculty at Rowan University increased over the past 10 years?
2. How do Gold Open Access publication rates (as a percentage of total publications) compare between STEM disciplines at Rowan University?
3. Who are the most prevalent Gold OA publishers in STEM at Rowan University?

Literature review

Information science research shows that the proportion of Open Access publication has increased steadily over the past three decades. In a comprehensive study of this topic, Xianwen Wang et al. presented an analysis of worldwide Gold OA publication from 1990 to 2016 (Wang et al. 2018). Their data showed a growth trend in Gold OA that began at 7.5% in 1990 and reached 25.4% by 2015. By country, “Brazil ranks the first with an OA percentage of 32.80%, followed by the Netherlands (25.19%) and UK (24.11%).” The amount of U.S.-authored Gold OA content was 20.18%. This study also found that biology-related fields and life and health-related fields have higher percentages of OA publication than others.

Another estimation of the proportion of scholarly publication that is open access comes from Vivek Kumar Singh et al., who looked at open access publications in India (Singh, Piryani, and Srichandan 2020). They found that about 24% of publications in Web of Science with an Indian author were open access, with about half of those (12%) being Gold OA. This study also looked at disciplinary differences in use of OA publication, finding that medicine, physics, and mathematics had the highest proportion of articles available in open access. This correlates with Wang’s findings that India’s Gold OA percentage was 10.39% in 2016 (Wang et al. 2018).

Gunnar Sivertsen et al. conducted a study of Gold Open Access in Finland, Belgium, Norway, and Poland over a six-year period (Sivertsen et al. 2019). They noted how the share of Gold OA articles was “linearly increasing” starting in 2011. The overall share of Gold OA articles varies by country and ranges from 5.7% (social sciences in Belgium) to 17.3% (medical and health sciences in Norway).

Heather Piwowar et al. estimated that as of 2018, at least 28% of the scholarly literature was open access (19 million OA articles at the time) and that the growth was “driven particularly by growth in Gold and Hybrid Open Access publications” (Piwowar et al. 2018). They found that more than half of publications are freely available in biomedical research and mathematics, while in chemistry and engineering less than 20% of the papers are open access. Green OA (author self-archiving of accepted manuscripts) is popular in physics and mathematics, where more than one-fifth of papers are available through repositories (mainly arXiv). Gold OA journals tend to be popular in the following disciplines: clinical medicine (10.3%), mathematics (11.2%), health (11.7%), and biomedical research (15.3%) (Piwowar et al. 2018).

At the University of Arkansas in the United States, Lutishoor Salisbury found that as of October 2015, 8% of their faculty publications in Web of Science were in open access journals (Salisbury, Chowdhury, and Smith 2017). The Physics department was the leader in open access publication with 24% of their articles being OA. Biological Sciences was the only department breaking 10%, at 12% OA.

David Hubbard analyzed open access journal publication in engineering at the top 25 graduate engineering universities according to US News & World Report (Hubbard 2015). Using Web of Science data for 1990 to 2013, Hubbard found increasing but very low Gold OA publication rates by engineering faculty at these institutions, with the 2013 rate at only 1%. An earlier study by William Mischo and Mary Schlembach indicated that “engineering faculty do not extensively publish in author pays Gold journals and had limited plans to do so in the future” (Mischo and Schlembach 2011).

The open access movement has tried to eliminate barriers to research access and improve the dissemination and reproducibility of research. OA publication levels have increased steadily over the past 3 decades, but the growth rate is not uniform across disciplines. As explained in a seminal publication by Anna Severin et al., there is no homogeneity of open access publishing practices across disciplines and sub-disciplines (Severin et al. 2020). Severin notes that Gold OA is popular in the medical sciences, followed by natural and technical sciences in embracing OA.

Severin also notes that scholars in physics, mathematics, astronomy, and biology were early pioneers in open access, while scholars in engineering and chemistry are more reluctant to make their research open access. Reasons for not pursuing open access include concerns regarding the quality of OA journals, including the quality and speed of peer review, as well as “high degrees of industrial integration with chemistry and engineering” (Severin et al. 2020). The disciplines that have pursued open access tend to be funded by project-specific grants, which allow scholars to “integrate fees for publication in Gold Open Access journals” (Severin et al. 2020). The push of national governments mandating that publicly funded research be published in OA journals has also played a key role in the growth in Gold Open Access.

The Ithaka S+R U.S. Faculty Survey 2021, published in July 2022, stated that the majority of faculty think that “the library should play a large role in open access publishing” (Blankstein 2022). Moreover, “40% indicated that libraries could pay publishers for open access and one third believe that their college or university office of research should pay publishers directly.” In short,

Faculty members continue to be interested in an open access publication model and see their library as key in financially supporting open access infrastructure. Faculty members want the library’s

involvement in financially supporting an open access system and are specifically open to their college or university library investing in open journal platforms and infrastructure to do so.

Specific disciplines such as physics, astronomy, mathematics, and computer science have a culture of sharing pre-prints before sending manuscripts to publishers for formal peer review and publication. For example, in physics, the culture of sharing pre-print article research dates to 1991 with the creation of the open repository arXiv. As Severin explains, scholars in these disciplines “value rapid publication, high visibility and large readership when choosing a publication” outlet. Even with the culture of sharing, it is estimated that in the natural sciences 40% to 50% of research remains behind a paywall (Severin et al. 2020).

In the life sciences, third-party funding plays an important role in helping to cover article processing charges and publish research without embargoes. Both the World Health Organization (WHO) and the Wellcome Trust in the UK have open access mandates, in addition to providing their own open repositories for publishing research. As funders continue to increase requirements such as making data openly available for reproducibility the push toward open access will continue. Starting in 2023 the U.S. National Institute of Health requires that all grant applications include a Data Management Plan and that data must be made publicly available, accelerating the trend toward more open access publications (Kozlov 2022).

Methodology

To identify faculty members’ publications, Elsevier’s Scopus database was chosen because it allows users to disambiguate author names by their affiliation. For each faculty member, the first and last name was entered in the Authors search combined with “Rowan University” as the affiliation. This brought up a list of their publications, which was limited to the past 10 years, 2013–2022.

The authors used the definition of Gold Open Access (OA) provided by Scopus. This definition is: “Published version with Creative Commons license, available on publisher platform. Documents are in journals which only publish open access” (McCullough 2022).

For the population of faculty to study, full-time tenured or tenure-track faculty from two schools within the university were chosen: College of Engineering and the College of Science and Mathematics. At Rowan University, the College of Science and Mathematics includes the following departments: Biological and Biomedical Sciences, Chemistry and Biochemistry, Computer Science, Mathematics, Physics and Astronomy, and Psychology. Our data did not include “¾ time faculty,” lecturers or adjuncts because they are not expected to do research. Administrators with previous faculty status were included in the analysis under the original departments where they hold the rank of tenured faculty.

The Scopus workflow consisted of noting how many total publications each faculty member had, then limiting to Gold Open Access (as defined by Scopus) to determine which publications were Gold OA. The number of Gold OA publications in each of the study years was recorded. Then, the counts were summed up for each person and for each department, and for each college.

This data made it possible to see what proportion of each department’s total publication count was Gold OA, and to compare the percentage of Gold OA publication between departments. The final step was to plot total Gold OA publication versus year for each college to identify any trends.

Results

Research question 1: Gold Open Access publication

The data shows that Open Access publication at Rowan University has definitely increased since 2013. In 10 years (from 2013 to 2022), the university has seen a 176% increase (from 21 to 58) in Gold OA publications. Since the OA Fund was created in June 2017, OA faculty publications have increased 123% (from 26 to 58). Figure 1 shows combined total OA publications for all faculty in the two colleges (Science and Mathematics, and Engineering).

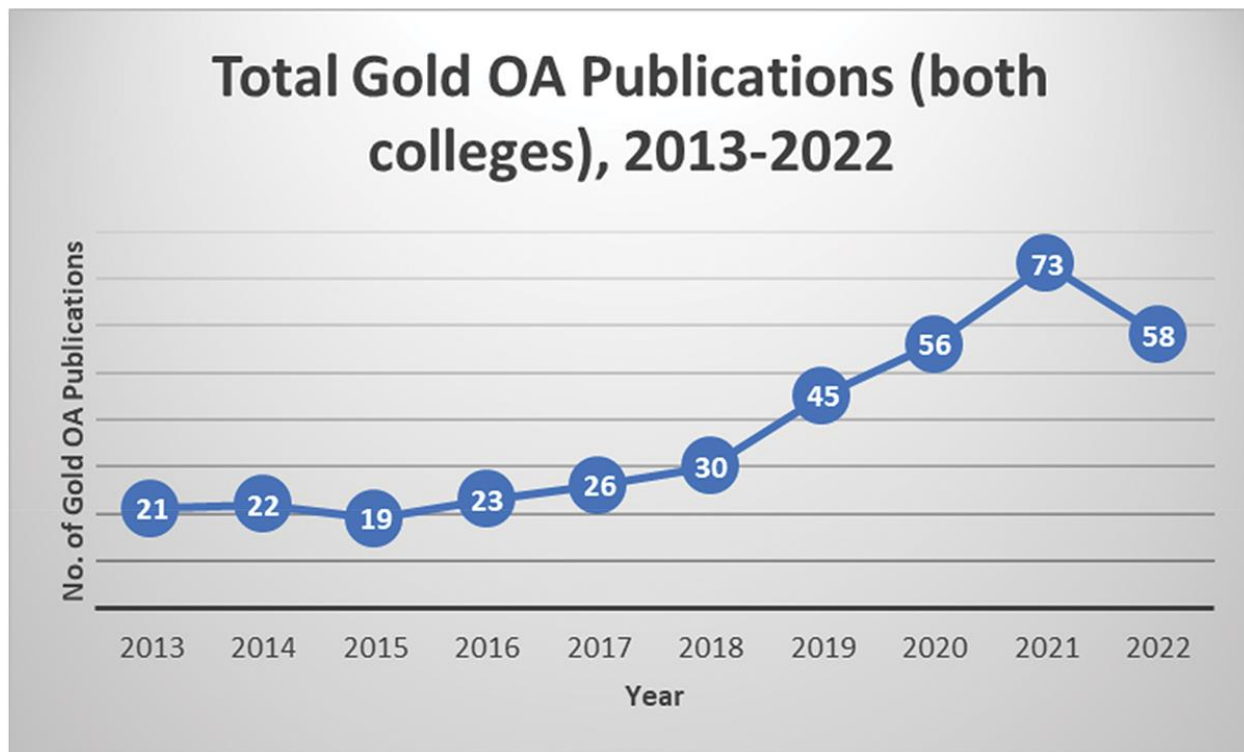


Figure 1. Gold OA publication 2013–2022.

Figure 2 shows results for the two colleges individually.

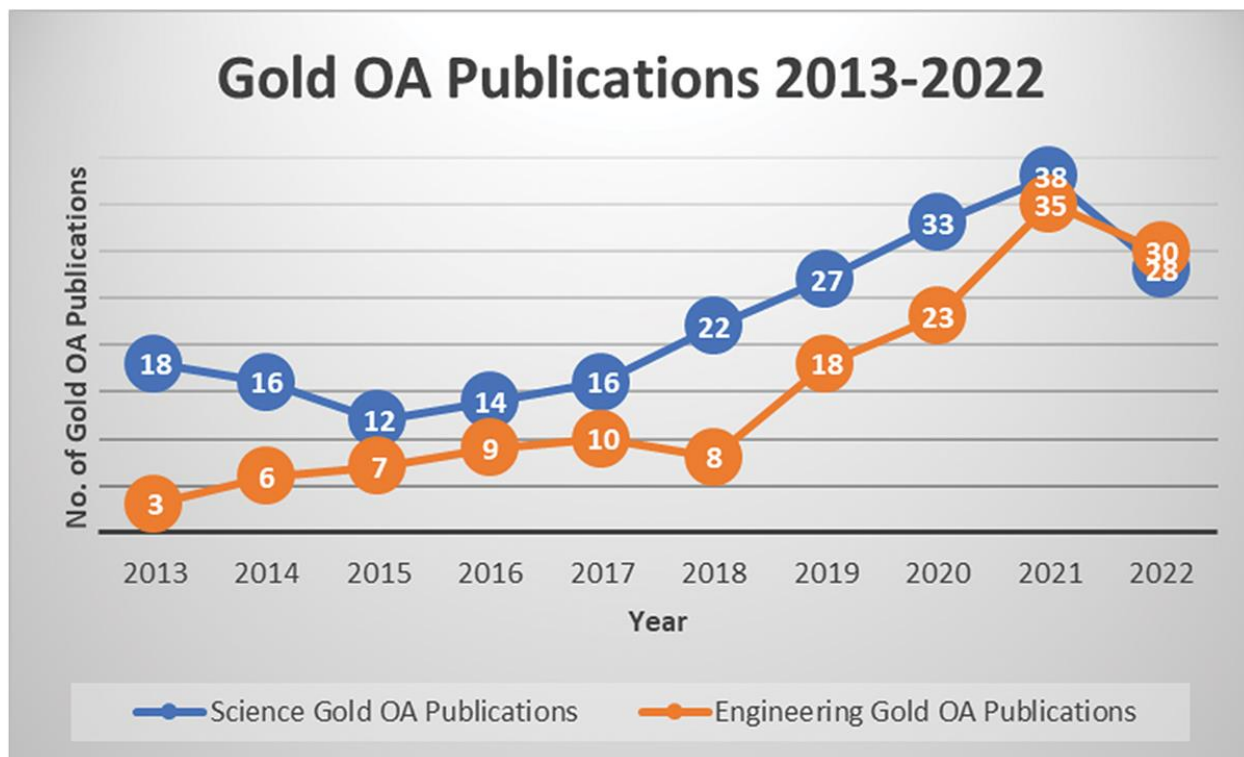


Figure 2. Gold OA publications by year, College of Science and Mathematics & College of Engineering Faculty.

Research question 2: Gold OA differences across departments

College of Science and Mathematics

Table 1 and Figure 3 show Gold Open Access publication by department from 2013 through 2022 in the College of Science and Mathematics.

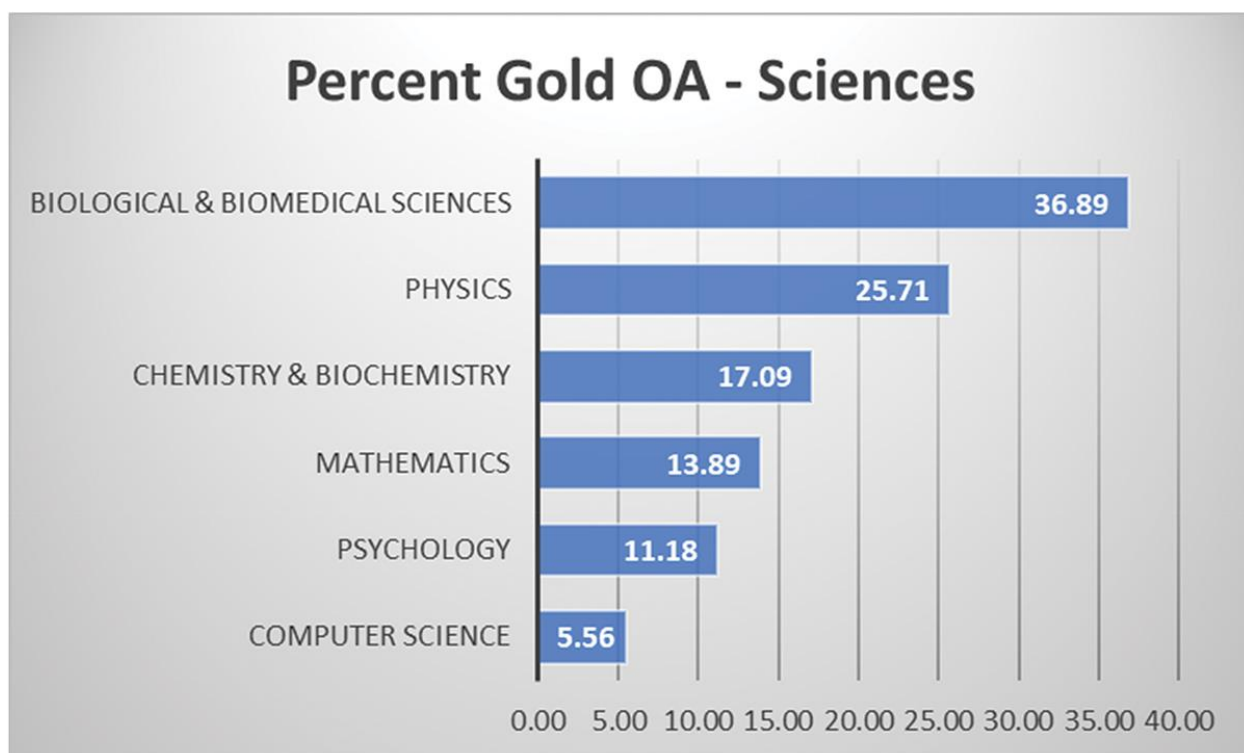


Figure 3. Percent Gold OA publication by science department.

Table 1. Overview of College of Science and Mathematics Gold Open Access publications.

DEPARTMENT	TOTAL ARTICLES	GOLD OA ARTICLES	% GOLD OA
Biological & Biomedical Sciences	244	90	36.89%
Physics	210	54	25.71%
Chemistry & Biochemistry	316	54	17.09%
Mathematics	108	15	13.89%
Psychology	331	37	11.18%
Computer Science	162	9	5.56%
TOTALS	1,371	259	18.89%

The total number of Gold OA publications by College of Science and Mathematics faculty between 2013 and 2022 was 259 out of 1,371, or almost 19%. However, there were considerable differences in percent of Open Access publication between departments.

Biological and Biomedical Sciences (36.89%) was the clear leader followed by Physics (25.71%). In these two departments more than a quarter of their publications were Open Access. In this study, we found the following rates of Gold OA publication in the remaining science departments: Chemistry & Biochemistry (17.09%), Mathematics (13.89%), Psychology (11.18%), and Computer Science (5.56%).

Looking at the trend over time, Table 2 and Figure 4 show that the university's College of Science and Mathematics faculty Open Access publication rate has increased 75% (from 16 to 28) since 2017, when the Open Access Publication Fund was established.

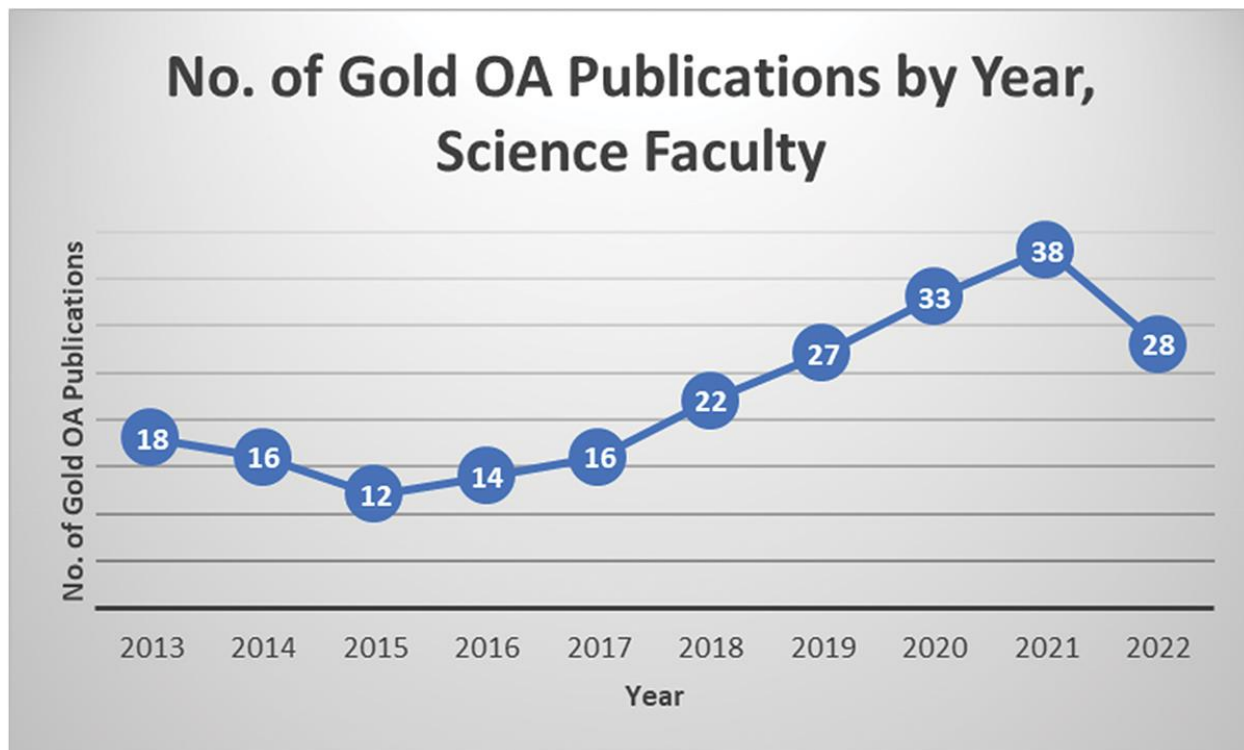


Figure 4. Gold OA publications by year, science, & math faculty.

Table 2. Gold OA publication by science faculty, 2013–2022.

Year	Gold OA Publications	Supported by OAPF
2013	18	0
2014	16	0
2015	12	0
2016	14	0
2017 (year OAPF started)	16	3
2018	22	4
2019	27	5
2020	33	2
2021	38	11
2022	28	Not available yet

College of engineering

Table 3 shows Gold Open Access publication by department from 2013 through 2022 in the College of Engineering. The total number of Gold OA publications by College of Engineering faculty was 149 out of 1,896 publications, or just under 8%. Biomedical Engineering had the highest percentage of Open Access publications at almost 14%, followed by Mechanical Engineering (10.5%).

Table 3. Overview of College of Engineering Gold Open Access publication.

Department	Total Articles	Gold OA Articles	% Gold OA
Biomedical Engineering	227	31	13.66
Mechanical Engineering	379	40	10.55
Chemical Engineering	303	25	8.25
Electrical Engineering	490	33	6.73
Civil Engineering	327	15	4.59
Engineering Education	170	5	2.94
TOTALS	1,896	149	7.86

Figure 5 shows this data in chart format. Overall percentages of Gold Open Access publications for Engineering faculty were much lower than Science and Mathematics, with none being over 15%. Eight publications were supported by the library's Open Access Publishing Fund (OAPF), of which seven were by Electrical or Civil Engineering faculty.

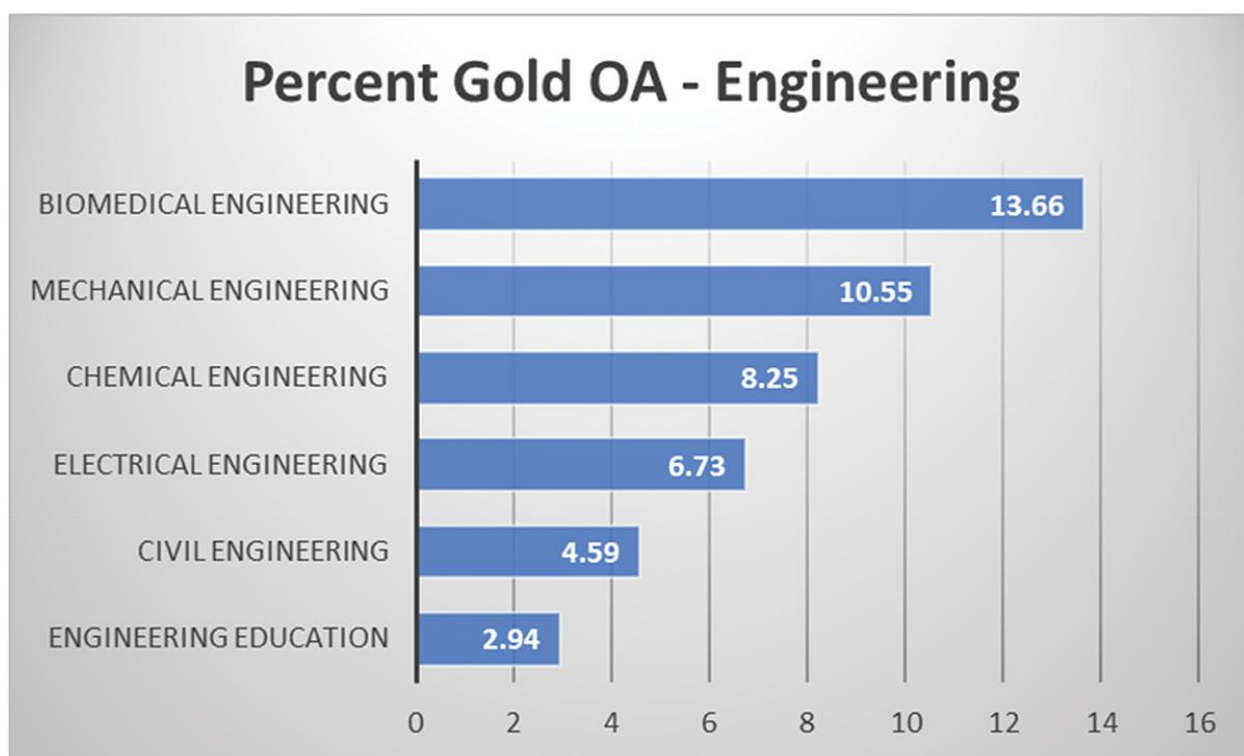


Figure 5. Percent Gold OA publications by engineering department.

Looking at the trend over time in Table 4 and Figure 6 show that Engineering faculty Gold OA publication increased significantly starting in 2019. The number of Gold OA publications by Engineering faculty in 2022 was ten times the number in 2013 (3 to 30). From 2017 (the year the Open Access Fund was created) to 2022 the number of Gold OA articles by Engineering faculty tripled (from 10 to 30), an increase of 200%.

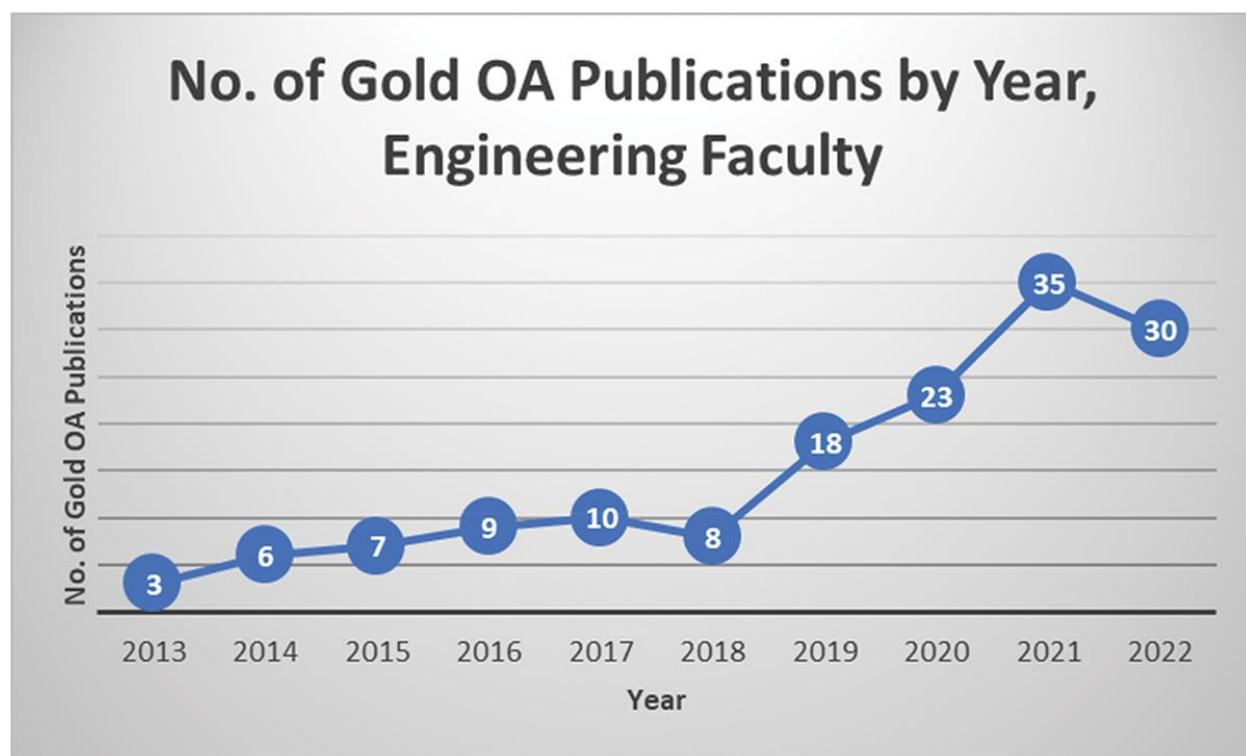


Figure 6. Gold OA publications by year, engineering faculty.

Table 4 Number of engineering Gold OA publications from 2013 to 2022.

Year	Engineering Gold OA Publications	Supported by OAPF
2013	3	0
2014	6	0
2015	7	0
2016	9	0
2017 (year OAPF started)	10	0
2018	8	0
2019	18	2

Year	Engineering Gold OA Publications	Supported by OAPF
2020	23	3
2021	35	2
2022	30	1

Many of the non-OA publications by engineering faculty were in conference proceedings, not journals. This is a more common form of research publication in engineering than in the sciences. Most engineering conferences do not offer open access as a form of publication yet, but the American Society for Engineering Education annual conference, which many local faculty members participate in, is one that does.

Discussion

Gold OA publication has increased for both science and engineering faculty at our university since 2013, with an upward trend starting in 2017, when the OAPF was introduced. Since its inception in 2017 the Libraries Open Access Publishing Fund has been entirely used every year indicating the demand for help with publishing costs. Over the past 6 years (2017–2022), a total of 46 articles were awarded funds, 33 of which were in STEM disciplines that were analyzed for this paper. The other 13 manuscripts were published by faculty in other colleges and schools at the university.

The departments with the most articles funded by our Open Access Publishing Fund were Chemistry & Biochemistry and Biological & Biomedical Sciences. Faculty whose research is related to biology have significantly higher percentages of OA publication than those in other departments. This makes sense given the emphasis on sharing of research results and data by U.S. federal government funders of medical research such as the National Institutes of Health (NIH) and National Science Foundation (NSF) in recent years.

Engineering disciplines have much smaller absolute numbers of OA publications, but the proportion of OA publications has increased more in recent years. This could be influenced by the amount of significant medicine-related research happening in the engineering departments of Biomedical Engineering, Electrical and Computer Engineering, and Mechanical Engineering since the university's affiliation with several teaching hospitals. Rowan University has two medical schools (osteopathic and allopathic) and a nursing school, allowing for cross-disciplinary research opportunities between medicine, allied health, and engineering.

The Open Access Publishing Fund (OAPF) seems to have had an impact on how often Rowan University faculty have published in Gold Open Access journals. Since the creation of the OAPF in 2017 until 2022, faculty publications in Gold OA journals have increased. This result supports research findings by Severin et al. that certain disciplines do publish more frequently in Gold OA journals: Biological & Biomedical Sciences (36.89%), Physics (27.9%), and Biomedical Engineering (13.66%). In contrast other disciplines have much lower rates of Gold OA publication.

While the availability of an Open Access Publishing Fund clearly helped motivate our faculty to publish in OA format, another important factor was the explosion of Gold OA journals in STEM fields over the past 10 years. *PLoS One* was one of the first such journals. MDPI, a publisher based

in Basel, Switzerland, offers dozens of journals in a variety of disciplines, all Gold OA with article processing fees. Frontiers is another all-OA publisher with a number of journals titled “*Frontiers in X*.” Many longtime STEM publishers, such as Elsevier, Wiley, Springer Nature, and others launched flagship Gold OA journals to accompany their traditional suite of journals. Some examples we encountered frequently included *Scientific Reports*, *Nature Communications*, *ACS Omega*, *RSC Advances*, *Physical Review X*, and *IEEE Access*.

Our analysis examined which were the most frequent Gold OA publishers by discipline. [Table 5](#) shows the rankings of the most popular publishers in each discipline.

In helping faculty decide where to publish open access, understanding which publishers offer open access journals can help in narrowing options for publication. Across various STEM disciplines, MDPI (n = 136) is the most popular publisher for Gold OA manuscripts. However, MDPI is not the most popular publisher for Mathematics and Psychology.

Table 5. Number of Gold OA publications by publisher and discipline.

Discipline	Gold OA publishers and number of publications in each
	Science and Mathematics
Biological & Biomedical Sciences (90 total)	<ol style="list-style-type: none"> 1. MDPI (31) 2. PLoS One (15) 3. Nature (10) 4. Biomed Central (8) 5. Elsevier (4) 6. Frontiers (3) and Oxford tied (3 each) 7. American Society of Microbiology & Impact Journals & PeerJ tied (2 each) 8. ACS, ARVO, Cambridge, Cold Spring Harbor Laboratory Press, Ivyspring International Publisher, Neoplasm Press, Sage, Society of Neuroscience, Taylor and Francis, Wiley (1 each)
Chemistry (55 total)	<ol style="list-style-type: none"> 1. MDPI (24) 2. Elsevier (6) & PLoS One tied (6 each) 3. Frontiers (3) 4. International Association of Physical Chemists, Royal Society of Chemistry, Serbian Chemical Society (2 each) 5. American Institute of Mathematical Sciences, Beilstein-Institut Zur Forderung der Chemischen Wissenschaften, Biomed Central, Dove Medical Press, ELife, Gadjah Mada University, Hindawi, Nature, Open Science Publishers, Taylor and Francis (1 each)
Computer Science (9 total)	<ol style="list-style-type: none"> 1. BioMed Central/Springer & MDPI tied (2 each)

Discipline	Gold OA publishers and number of publications in each
	2. IEEE, Institute of Electrical and Electronics Engineers Inc., JMIR Publications Inc., Open Exploration Publishing Inc., Wiley (1 each)
Mathematics (15 total)	1. Biomed Central (3) 2. American Physical Society (2) 3. American Statistical Association, Cambridge University, Elsevier, European Geosciences Union, Frontier, Genetics Society of America, Hindawi, MDPI, PLoS One, Walter de Gruyter (1 each)
Physics (54 total)	1. MDPI (31) 2. American Physical Society (10) 3. Springer/Nature (6) 4. Elsevier (3) 5. ACS, American Institute of Physics, IOP Publishing, Frontiers (1 each)
Psychology (37 total)	1. JMIR Publications (12) 2. PLoS One (5) 3. Biomed Central (4) & Frontiers tied (4 each) 4. Elsevier & Hindawi & MDPI & Sage tied (2 each) 5. AME Publishing, Cambridge, Dove Press, Wiley (1 each)
Engineering	
Biomedical Engineering (31 total)	1. Springer Nature & MDPI tied (8 each) 2. Frontiers (5) 3. PLoS (2) 4. Wiley, Elsevier, Sage, Hindawi, RSC, ARVO, Impact Journals, AAAS (1 each)
Chemical Engineering (25 total)	1. MDPI (9) 2. RSC (4) 3. Elsevier (3) 4. Springer Nature, ACS, Frontiers (2 each) 5. SPIE, Wiley, Oxford Academic (1 each)
Civil Engineering (15 total)	1. MDPI (6) 2. Elsevier (5) 3. Pouyan Press (2) 4. BioMedCentral, Hindawi (1 each)

Discipline	Gold OA publishers and number of publications in each
Electrical & Computer Engineering (33 total)	<ol style="list-style-type: none"> 1. MDPI (8) 2. Optica (5) 3. Wiley (4) 4. Frontiers, BioMedCentral (3 each) 5. Elsevier, Hindawi, IEEE (2 each) 6. CSEE, AIMS Press, Springer Nature, PLoS (1 each)
Experiential Engineering Education (5 total)	<ol style="list-style-type: none"> 1. MDPI (3) 2. Intl. Assoc. of Online Engineering, Pontificia Universidad Javeriana (1 each)
Mechanical Engineering (40 total)	<ol style="list-style-type: none"> 1. MDPI (11) 2. Springer Nature, Elsevier (9 each) 3. AAAS (3) 4. Frontiers (2) 5. ACS, APS, RSC, Optica, Hindawi, Wiley (1 each)

Limitations

This study is based on publication output at our university and may not apply to other institutions. The results tell us more about whether the Rowan University Libraries' work in educating the faculty about Open Access was effective, than whether Open Access publication is increasing globally. Faculty Publications which were not indexed in Scopus were not included in this study and their absence could potentially have affected the results. Scopus search is not perfect and metadata issues (like mislabeling an article as Gold OA) could have affected the results.

Conclusions

Open Access scholarly publication continues to grow and incentives, such as university/libraries-sponsored open access funds, mandates for data and research to be made available upon publication, and integrating article processing charges into grants will continue to advance the open access movement. In 6 years (2017–2022) since the OAPF was started at Rowan University OA publications in STEM have increased 123%.

Specific STEM disciplines, such as Biomedical Engineering, Biological & Biomedical Sciences, and Physics, publish at higher Gold OA rates in comparison to Mathematics, Chemistry & Biochemistry, Psychology, Computer Science, Mechanical, Chemical, Electrical and Civil and Environmental. Even in STEM publishing, continued support in funding APCs is needed, and academic libraries can be leaders in growing the OA movement and improving Gold OA publication rates.

Acknowledgments

The authors would like to extend a heartfelt thank you to the reviewers who read earlier versions of this manuscript, and provided insightful advice and suggestions for improving the research: Michelle Kowalsky, Rowan University and Kara Blizzard from the Library Writing Cooperative and University of Alberta.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Blankstein, M. 2022. Ithaka S+R US Faculty Survey 2021. Accessed August 17, 2022.

<https://sr.ithaka.org/publications/ithaka-sr-us-faculty-survey-2021/>

Hubbard, D. E. 2015. A local and multi-institutional study of open access engineering publishing. Paper presented at the ASEE Annual Conference & Exposition , Paper ID #12927. Seattle, Washington.

Kozlov, M. 2022. NIH issues a seismic mandate: Share data publicly. *Nature* 602 (7898):558–59. doi:10.1038/d41586-022-00402-1. McCullough, R. 2022. Scopus open access filters and new Green OA full-text access. Accessed August 20, 2022.

<https://blog.scopus.com/posts/scopus-filters-for-open-access-type-and-green-oa-full-text-access-option>

Mischo, W. H., and M. C. Schlembach. 2011. Open access issues and engineering faculty attitudes and practices. *Journal of Library Administration* 51 (5–6):432–54. doi:10.1080/01930826.2011.589349.

Piwowar, H., J. Priem, V. Larivière, J. P. Alperin, L. Matthias, B. Norlander, A. Farley, J. West, and S. Haustein. 2018. The state of OA: A large-scale analysis of the prevalence and impact of open access articles. *PeerJ* 6:e4375. doi:10.7717/peerj.4375.

Salisbury, L., A. R. Chowdhury, and J. J. Smith. 2017. Faculty publications from a research university scholarly impact of OA vs Non OA. *Science & Technology Libraries* 36 (2):187–99. doi:https://doi.org/10.1080/0194262X.2016.1273815

Severin, A., M. Egger, M. P. Eve, and D. Hürlimann. 2020. Discipline-specific open access publishing practices and barriers to change: An evidence-based review. *F1000research* 7:1925. doi:https://doi.org/10.12688/f1000research.17328.2.

Singh, V. K., R. Piryani, and S. S. Srichandan. 2020. The case of significant variations in gold–green and black open access: Evidence from Indian research output. *Scientometrics* 124 (1):515–31. doi:10.1007/s11192-020-03472-y.

Sivertsen, G., R. Guns, E. Kulczycki, and J. Pölönen 2019. The use of Gold Open Access in four European countries: An analysis at the level of articles. 17th International Conference on

Scientometrics & Informetrics: ISSI 2019: With a Special STI Indicators Conference Track: Proceedings 2:1600–1605, Rome: Edizioni Efesto.

Wang, X., Y. Cui, S. Xu, and Z. Hu. 2018. The state and evolution of Gold Open Access: A country and discipline level analysis. *Aslib Journal of Information Management* 70 (5):573–84. doi:10.1108/AJIM-02-2018-0023.