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Assessing open access publishing activities to inform open publishing services at a large R1 institution

Wenli Gao [1]

Xiao Zeng [2]

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Abstract

Open Access (OA) publishing is continually reshaping the model of scholarly communication, enabling research outputs to be disseminated more widely and to have greater impact. In response, academic institutions need to assess their publishing landscapes to inform data-driven strategies that support OA adoption. This study mainly investigates publishing patterns at the University of Houston (UH), a large urban institution with "very high research activity" status under the Carnegie Classification. Using bibliographic data from OpenAlex (2020–2024), the authors analyzed OA publishing trends, citation differences between OA and non-OA articles, disciplinary concentrations, top publishers, and associated Article Processing Charges (APCs). Findings reveal key insights into UH authors' engagement with OA models and inform institutional efforts to enhance open publishing support, develop targeted outreach initiatives, and negotiate better institutional agreements. The study contributes to the broader discourse in scholarly communication by offering a replicable approach for institutional-level OA assessment.

Introduction

Open Access (OA) publishing is reshaping scholarly communication by increasing the accessibility, visibility, and impact of research outputs. As universities, libraries, and researchers increasingly embrace open models, understanding institutional publishing behaviors is essential for

[1] *Wenli Gao, Head of Collections Strategies and Services, University of Houston, Houston, TX, USA;* [2] *Xiao Zeng, Open Publishing Librarian, University of Houston, Houston, TX, USA*
E-mail: wgao5@uh.edu

developing informed, effective strategies that support OA adoption. While OA offers significant benefits, including enhanced citation rates, global reach, and alignment with public access mandates, it also presents challenges, such as article processing charges (APCs), inconsistent publisher policies, and disciplinary disparities in OA adoption. Recent research has examined how individual scholars navigate these tensions. For instance, Ali et al. (2023) explored how STEM researchers weigh journal prestige, publication speed, and OA considerations, revealing the complex trade-offs scholars face in a shifting academic landscape. However, such studies often focus on individual decision-making rather than institutional dynamics. Broader analyses of how universities, particularly research-intensive institutions, collectively engage with OA publishing remain limited. Few studies have examined institution-wide patterns and the role of the library system in shaping publishing behaviors. Piwowar et al. (2018) found that institutional policies and financial factors are key barriers to OA adoption, but they didn't fully explore how libraries influence researchers' publishing decisions. Hadad and Aharony (2024) highlighted the library's involvement in promoting OA to their community, yet focused primarily on individual librarians' efforts rather than broader institutional systems. This literature gap suggests the need for a more comprehensive investigation into how large research institutions support OA initiatives. This study addresses that gap by examining OA publishing activity at the University of Houston (UH), a Carnegie-classified R1 research institution with over 46,000 students and a library system comprising more than 50 librarians and 100 staff. By analyzing institutional publishing patterns from 2020 to 2024 using OpenAlex data, we assess trends in OA publishing, identify disciplinary and publisher-level dynamics, and evaluate the financial implications to guide strategic development of open publishing services, and guide resource allocation.

Methodology

This study employed bibliometric analysis to evaluate OA publishing activity at UH between 2020 and 2024. The primary data source was OpenAlex, an open and comprehensive index of scholarly works. This study focused on a subset of metadata fields, including publication type, access status, authorship, institutional affiliation, citation counts, journal information, and publisher details. OpenAlex was selected for its transparency, interoperability, and wide adoption in bibliometric research.

We queried OpenAlex using the University of Houston as the institutional identifier in January 2025 to retrieve articles affiliated with UH authors. The dataset was cleaned using Excel and OpenRefine to ensure reliability. Records with invalid OpenAlex IDs (i.e., not matching the format "https://openalex.org/W0000000000"), nonsensical strings, and duplicate entries were removed. Rows were excluded when data type mismatches were detected between expected and actual values. Publisher names were normalized to ensure consistency, allowing for accurate aggregation and analysis of publishing trends by publishers. This cleaning process reduced the number of publication records from 16,846 to 16,751 valid entries.

Following cleaning and validation, we generated descriptive statistics and cross-tabulations. We utilized Google Looker Studio to create interactive visualizations displaying UH's publishing trends. Google Looker Studio is a free web-based data visualization platform that allows multiple users to build

and refine our visualizations simultaneously, while integrating with the shared datasets to ensure the consistency across our collaborative study. We imported the cleaned OpenAlex data into Google Looker Studio and structured it to support filtering based on the study's defined metadata fields. The resulting visualizations include annual publication numbers, the proportion and percentage of OA publications, citation differences between OA and non-OA articles, and temporal OA publishing trends. Additionally, APC data estimates institutional expenditures and identifies high-cost journals and publishers. The study also explored institutional repositories as OA support services and disciplinary distributions align with UH colleges. Ultimately, these visualizations provide a solid data foundation for institutions to develop OA publishing support strategies, conduct targeted outreach initiatives, and negotiate better agreements, offering a replicable approach to institutional-level OA assessment.

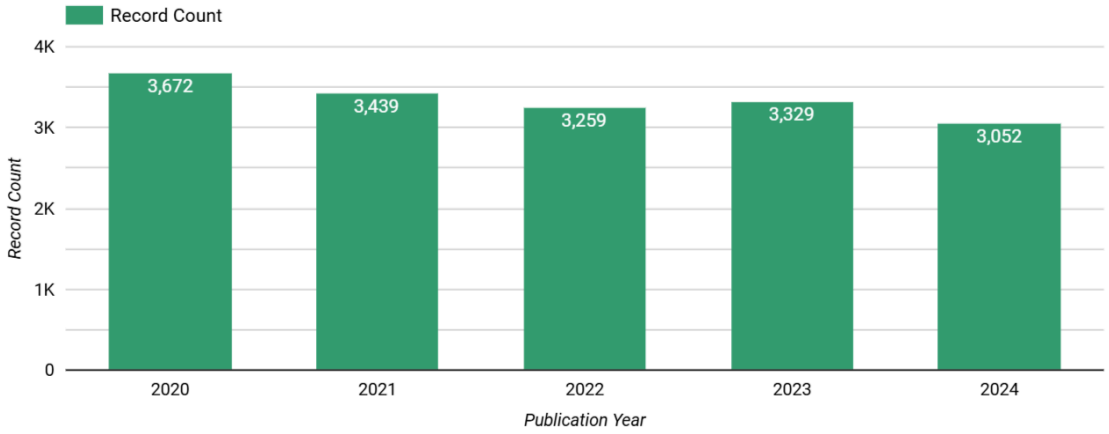
Findings and Discussions

Overall Publishing Trends (2020-2024)

Over the past five years, UH's research output has fluctuated. From 2020 to 2022, the number of articles decreased from 3,672 to 3,259, reflecting an 11.6% decline. This was followed by a slight increase of 2.1% in 2023, and then an 8.3% drop in 2024 (See Figure 1).

Figure 1

Number of Articles Published at UH (2020–2024, N = 16,751)



Several factors might explain these trends, including disruptions caused by the COVID-19 pandemic, reductions in research funding, changes in faculty staffing, or shifting institutional priorities. As Piwowar et al. (2018) discovered, institutional policies and financial factors pose significant barriers to open access adoption. During the pandemic and post-pandemic, these factors may have contributed to fluctuations in research output. However, these explanations remain largely speculative, as the OpenAlex dataset does not directly capture the contextual factors that might underlie the observed patterns. While OpenAlex provides valuable metadata on scholarly publications, such as author affiliations, publication venues, and citation metrics, it lacks detailed information about institutional

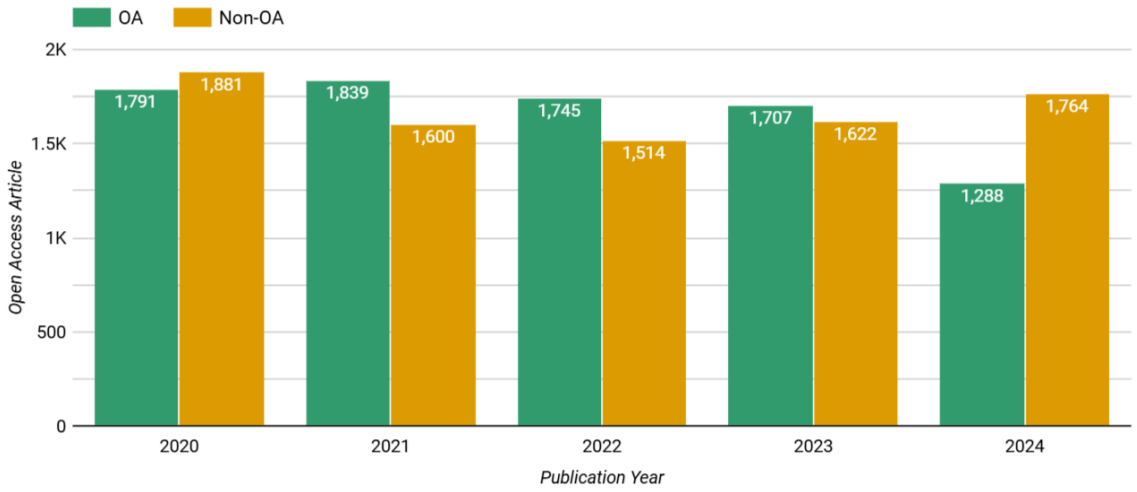
priorities, funding allocations, or the strategic goals that might influence faculty publishing behavior. To rigorously confirm whether these proposed contributing factors are indeed at play, one would need to incorporate additional data sources. These could include institutional research reports that outline university research strategies, funding records that indicate investment in specific disciplines or publication types, and surveys that capture faculty perspectives on publishing practices, incentives, and constraints. Without such complementary data, any interpretation of the trends observed in OpenAlex remains tentative.

Open Access vs. Non-Open Access Trends

The proportion of OA articles remained relatively stable from 2020 to 2023, ranging from 48.77% to 53.54%, but saw a significant drop of 24.5% in 2024 from the previous year. In contrast, non-OA articles followed a downward trend until 2022, then sharply increased from 2023 to 2024. This shift may be attributed to reduced institutional promotion of OA publishing, limited author awareness of OA benefits, and declining funds allocated for OA publication support (See Figure 2).

Figure 2

Number of Open Access and Non-Open Access Articles at UH (2020–2024, N = 16,751)



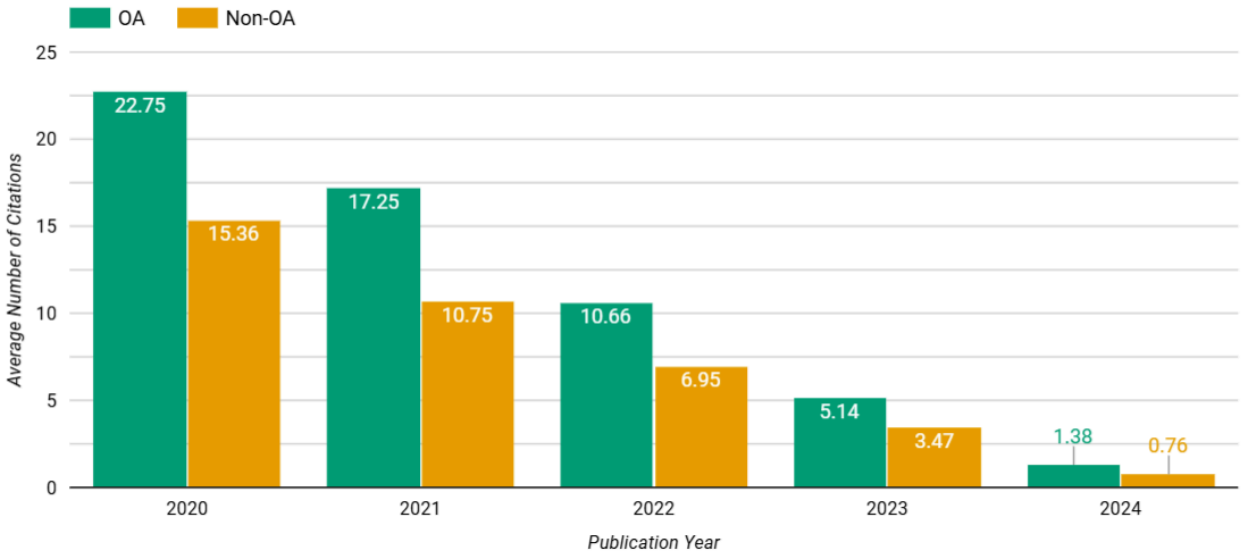
Citation Impact of Open Access Publications

A key finding of this study is the consistent citation advantage associated with OA articles. Across the dataset analyzed, articles published under OA models receive more citations on average than those published under traditional, paywalled models. This citation differential suggests that making scholarly work freely available to all readers, regardless of institutional affiliation or financial resources, significantly enhances its visibility, reach, and scholarly impact. Several factors may contribute to this citation advantage. First, OA articles are more easily discoverable by a global audience, including

researchers in lower-income institutions or countries where access to subscription-based journals is limited. Second, the unrestricted availability of OA articles facilitates quicker and broader dissemination, allowing other scholars to engage with, cite, and build upon the work more rapidly. Additionally, OA content is often shared more widely through social media, repositories, and academic networks, all of which can increase its exposure. This aligns with broader literature indicating that freely accessible research is cited more frequently (Piwowar et al., 2018) , confirming the value of OA publishing for increasing scholarly impact (See Figure 3).

Figure 3

Average Citations count by OA and non-OA articles



For authors, this may provide an incentive to consider OA publishing not only as a matter of public good or compliance with funder mandates, but also as a strategic choice for enhancing scholarly visibility. For institutions and policymakers, these findings underscore the potential benefits of supporting OA initiatives and infrastructures that broaden access to academic knowledge on a global scale.

Top Publishers and Institutional Publishing Patterns

An analysis of UH's publishing landscape reveals that Elsevier, Wiley, IEEE, Springer Nature, and Taylor & Francis are the leading publishers of UH's research output (See Table 1).

Table 1

Top 10 Publishers for Articles Published at UH (2020–2024)

Rank	Publisher	# of Articles
1	Elsevier	3097
2	Wiley	1168
3	Institute of Electrical and Electronics Engineers (IEEE)	1070
4	Springer Nature	1047
5	Taylor & Francis	761
6	Multidisciplinary Digital Publishing Institute (MDPI)	627
7	American Chemical Society	606
8	SAGE Publishing	577
9	Oxford University Press	496
10	Lippincott Williams & Wilkins	374

However, when focusing on OA articles, the distribution of top publishers shifts (See Table 2). While eight publishers remain consistent across both categories, American Physical Society and Frontiers Media emerge as major OA publishers. Interestingly, Sage and Lippincott appear among the top publishers for overall research output but not for OA articles. This suggests that while UH researchers frequently publish with these publishers, they do not choose OA options as often. Understanding the reasons behind this trend could inform targeted institutional OA initiatives. It will also support the establishment of transformative agreements and collaborative relationships with key publishers, which will create more viable OA publishing opportunities for UH authors.

Table 2

Top 10 Publishers for OA Articles Published at UH (2020–2024)

Rank	Publisher	# of Articles
1	Elsevier	1396
2	Multidisciplinary Digital Publishing Institute (MDPI)	627
3	Springer Nature	777
4	Wiley	558
5	Institute of Electrical and Electronics Engineers (IEEE)	523
6	Oxford University Press	345
7	American Physical Society	289
8	Frontiers Media	259
9	American Chemical Society	199

10	Taylor & Francis	194

Article Processing Charges (APCs) and Institutional Agreements

One of the major challenges of open access (OA) publishing is the cost of article processing charges (APCs). While some publishers offer fee waivers or institutional agreements to reduce the burden, others continue to impose high publication fees. To address this issue, UH is actively seeking ways to reduce the financial burden of open access (OA) publishing for our patrons. We have made institutional agreements with selected publishers to provide APC discounts or full waivers for authors affiliated with these publishers. Currently, UH is a member of MDPI, which entitles affiliated authors to a 10% discount on APCs. Our findings indicate that this membership is beneficial. Our annual membership fee is minimal, and the cumulative savings from the 10% APC discount significantly outweigh the cost, given UH's overall volume of publications with MDPI. In short, the membership yields substantial net savings and represents a cost-effective support mechanism for OA publishing. Additionally, new major OA publishers, such as American Association for the Advancement of Science (AAAS) and Public Library of Science (PLOS), have emerged in our dataset. These growing presence highlights potential areas for future institutional collaboration and funding allocation. These trends require further exploration and strategic planning (See Table 3).

Table 3

Top 10 Publishers by Total APC Charge (2020–2024)

Rank	Publisher	Total APC paid
1	Multidisciplinary Digital Publishing Institute (MDPI)	$1,405,583
2	Springer Nature	$1,358,057
3	Elsevier	$1,077,505
4	Oxford University Press	$685,935
5	Wiley	$660,013
6	Frontiers Media	$650,542
7	American Physical Society	$251,850
8	Institute of Electrical and Electronics Engineers (IEEE)	$178,700
9	American Association for the Advancement of Science (AAAS)	$128,930
10	Public Library of Science (PLOS)	$116,520

Distribution and Status of OA Publications with a Focus on Repositories

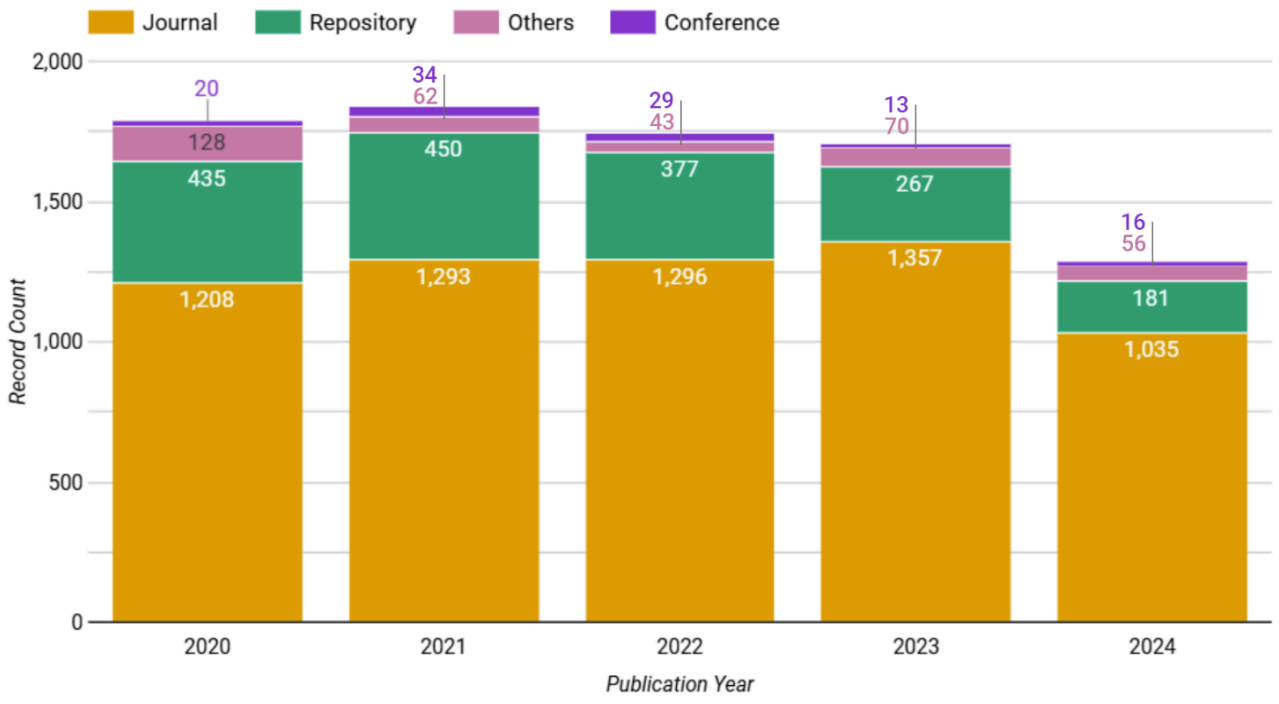
Repositories are digital platforms used for archiving, preserving, and disseminating open-access scholarly outputs to the public. There are various types of repositories, including disciplinary repositories (e.g., arXiv and bioRxiv), general-purpose repositories (e.g., Zenodo and Open Science Framework), and institutional repositories (IRs). Repositories play a crucial role in expanding the

visibility of research, especially when articles are behind paywalls in traditional journals. This study builds on a comprehensive understanding of the University of Houston's OA publishing patterns and collaborative efforts. It begins by examining the overall contribution of repositories to OA dissemination, and then narrows to the focus of role and impact of institutional repositories.

Analysis of the OA publishing locations from 2020-2022 shows that the majority of OA articles are published in journals, as authors often choose OA journals to maximize visibility and accessibility. The second most common publishing location are repositories. Although repositories remain behind journals in terms of volume, they still account for a significant proportion, highlighting the important role of IRs in disseminating scholarly outputs. In addition to journals and repositories, a small proportion of open access (OA) articles were disseminated through alternatives such as conferences and other platforms. Although these represent a small percentage, they are often important channels for disseminating early-stage research, pilot studies, and community-engaged scholarship that is not usually published in journals. Figure 4 tracks the distribution of OA articles by publication location from 2020 to 2024.

Figure 4

Distribution of OA Articles by Publication Location (N = 8,370)



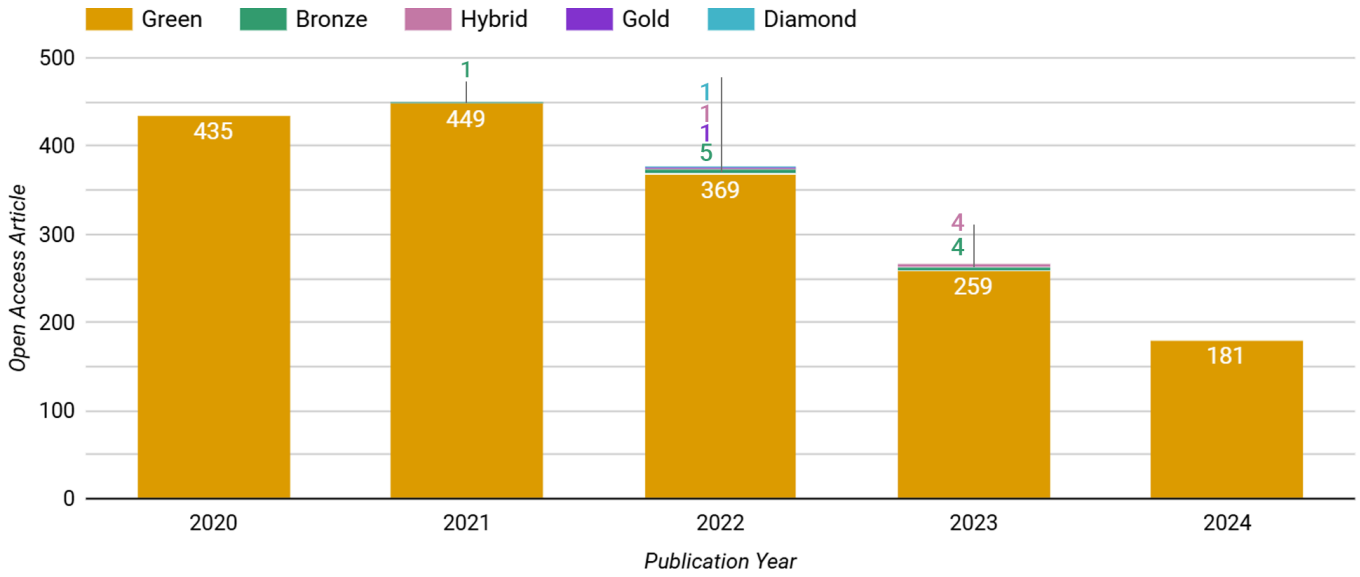
With a specific focus on repositories, a closer examination of the OA status of articles published in repositories shows a particular focus on Green OA and other OA models. Typically, Green OA refers to articles made freely available through repositories via self-submission of the final manuscript or preprint version. Over 95% of OA articles in repositories each year are classified as Green OA. (See

Figure 5). Depositing in repositories not only enhances research visibility and accessibility to global audiences and allows authors to self-archive without incurring APCs.

For a more detailed perspective, Figure 5 displays the presence of other OA status models, including Bronze, Gold, Hybrid, and Diamond, which typically involve various publisher fees and restrictions. While these other OA models are also present, the dominance of Green OA underscores its significance and offers authors a cost-efficient way to share their scholarly outputs with the broader audience.

Figure 5

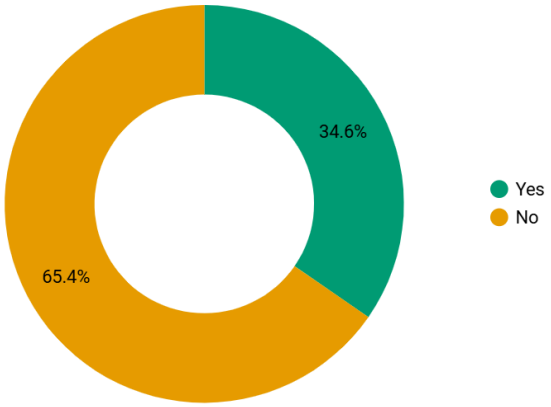
OA Status in Repository: Green OA vs. Other Types (N = 1,710)



Although over 95% of OA articles in repositories are classified as Green OA, typically self-deposited by the authors, this doesn't contradict the fact that some OA articles in repositories are funded by APCs before being deposited. These articles are still classified as Green OA because the key characteristic is the self-archiving of the article in a repository, regardless of whether the article was initially published in a journal that required an APC. Even if an article is funded by an APC, it can still be deposited in a repository. This allows the article to retain its Green OA classification through the self-archiving process. By depositing the final manuscript or preprint version in a repository, authors can increase the visibility and accessibility of their work on multiple platforms at no additional cost. Figure 6 shows the overlap between articles with APC funding and articles in repositories with OA. 34.6% of the articles marked "Yes" were in repositories and were associated with APC payments for the original journal publication, while 65.4% of the articles marked "No" had no APC involved. This demonstrates that while most repository content follows the traditional Green OA route, a significant subset originates from APC-funded publications. Authors have additionally made this content available through self-archiving.

Figure 6

Overlap bBetween APC Costs and OA Articles in Repositories (N = 1,710)



Top 10 Repositories for OA Articles Published by UH authors

This analysis examines the top 10 repositories across 102 institutions and organizations where UH authors published their open access work from 2020 to 2024. The data shows that a significant number of UH authors contribute to well-established repositories relevant to their fields. Repositories such as the National Institutes of Health (NIH) and the Office of Scientific and Technical Information (OSTI) underscore the importance of government-funded platforms and the broad reach of UH authors' contributions. Meanwhile, repositories such as Cornell University and Cold Spring Harbor Laboratory support a wide range of academic STEM fields. Although the University of Houston Institutional Repository (UHIR) isn't listed in the top 10 repositories for OA articles published by UH authors, it remains an important platform for disseminating UH research, particularly for early-career scholars. This also provides an opportunity for UH to further engage with these external repositories while promoting the use of our own IR. See Table 4 for the number of OA articles published by UH authors in the top 10 repositories.

Table 4

Top 10 Repositories for OA Articles Published by UH Authors

Rank	Publisher	Total Number of Articles
1	National Institutes of Health	576
2	Cornell University	514
3	Office of Scientific and Technical Information	139
4	European Bioinformatics Institute	35
5	Centre National de la Recherche Scientifique	28
6	European Organization for Nuclear Research	26

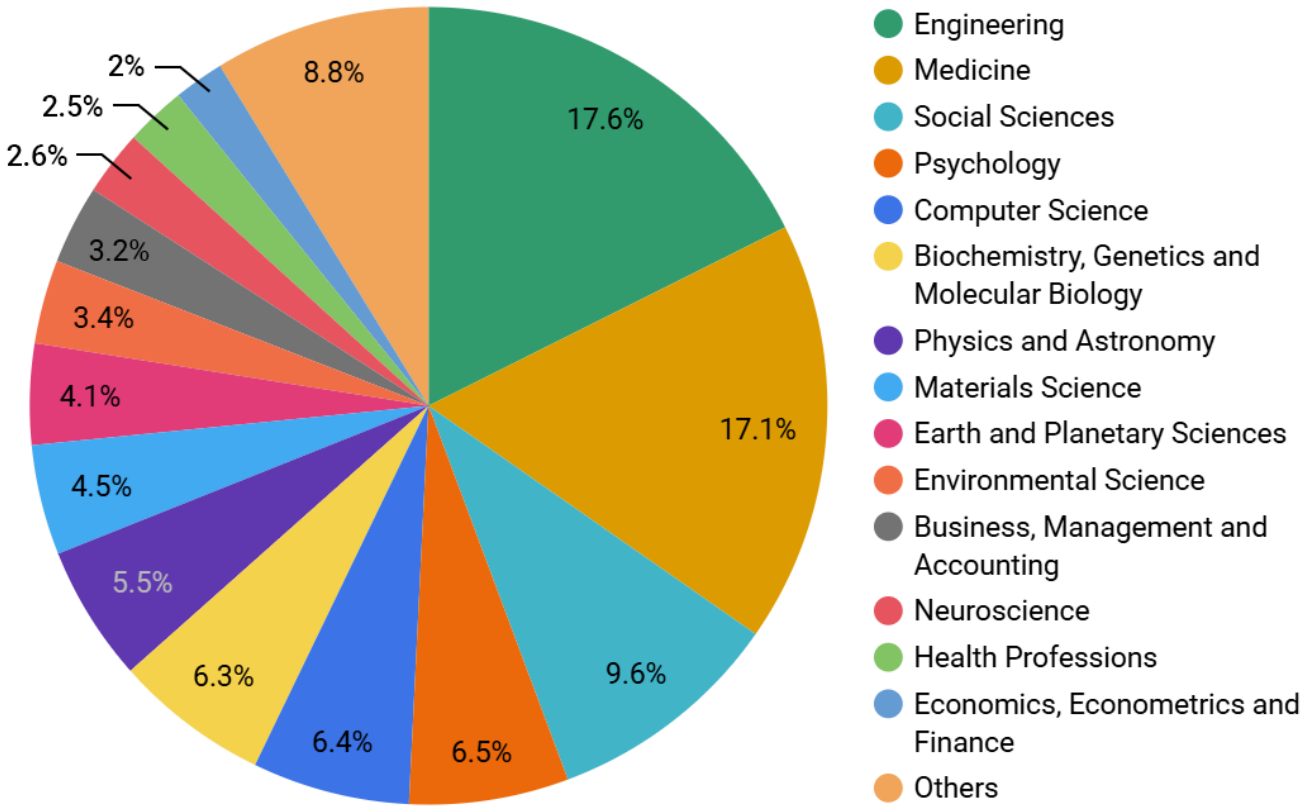
7	American Society For Engineering Education	26
8	Cold Spring Harbor Laboratory	25
9	California Digital Library	20
10	Center for Open Science	19

OA Article Subject Breakdown and Trends by UH Colleges

An important aspect of this analysis involves examining the distribution of OA articles across various subjects and disciplines. As shown in Figure 7, the data indicate that engineering is the most common subject area, accounting for 17.6% of the total with 2,950 articles, followed by medicine with 17.1%. Based on this subject breakdown, the data can be aligned with the organizational structure of UH's colleges to identify which colleges are most active in publishing OA articles. This analysis highlights emerging trends and provides an opportunity to identify areas where library services can be improved, thereby encouraging broader engagement with OA publishing across the UH community.

Figure 7

Subject Breakdown of All OA Articles from 2020-2024 (N = 16,751)



To further verify the alignment of current subject trends across UH colleges, an analysis of article subject and disciplinary metadata was conducted, as shown in Figure 8.

Figure 8

Trends in OA Articles by UH Colleges in the Repositories (N = 1,710)

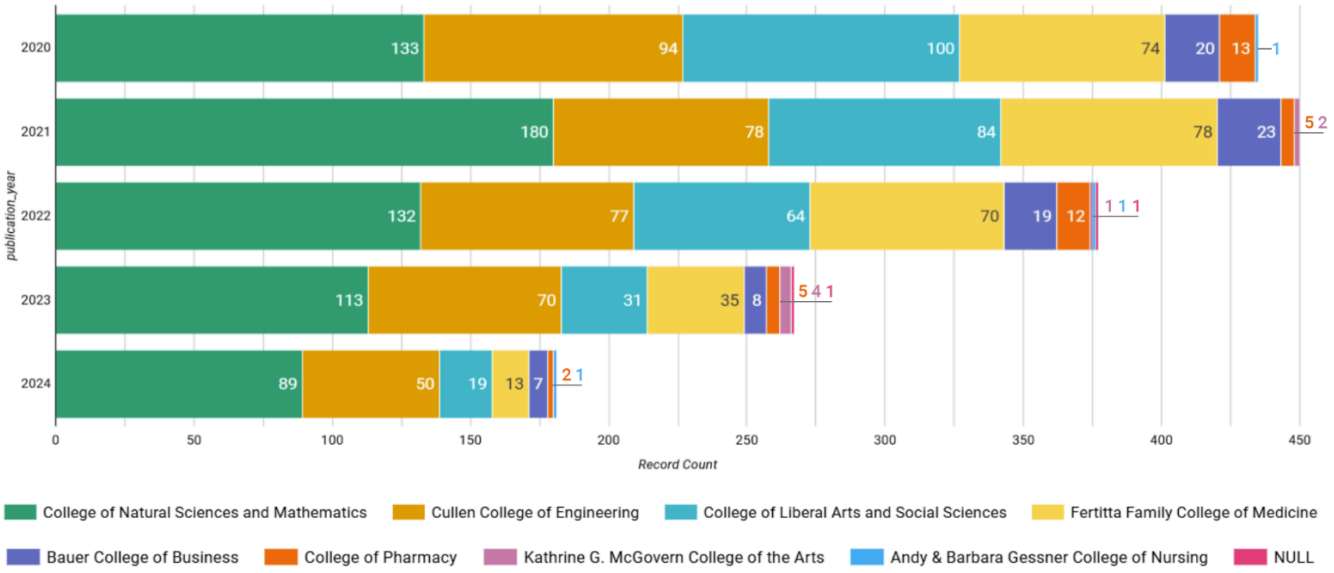


Figure 8 illustrates the trends in OA articles from 2020 to 2024, categorized by UH colleges and the number of OA articles deposited in repositories. The distribution shows a remarkable and expected pattern: STEM fields dominate OA article deposits in repositories. This is likely due to the strong emphasis on open access within the STEM community, where research is often publicly funded, and there is a concerted effort to make research results freely available.

However, UH is committed to ensuring that all disciplines, not just STEM, are equally supported in their efforts to deposit and access OA materials. Based on the data analysis and findings, there is a clear opportunity to improve library services, expand outreach to a wider range of patrons, and increase the research impact of the scholarly output produced by the UH community.

Conclusion

This study offers a comprehensive analysis of UH's publishing activities from 2020 to 2024, with a focus on OA and non-OA research outputs. Through visual and quantitative examination of cleaned publication data, the analysis sheds light on key patterns shaping UH's research dissemination practices. Notable findings include a consistent citation advantage associated with OA publications, indicating that freely accessible research tends to reach broader audiences and achieve greater impact. The data also reveal evolving patterns in publisher influence, suggesting shifts in institutional publishing preferences and potential changes in publisher dominance over time. Additionally, the study highlights the financial

dimensions of OA publishing, particularly around APCs, which represent both a barrier and an opportunity for expanding OA adoption.

To advance OA publishing at UH, the university should consider adopting multifaceted institutional strategies. These may include increasing researcher awareness of OA benefits, such as visibility, citation, and public access. Strategic negotiations with publishers to secure more favorable OA publishing agreements, such as transformative or read-and-publish deals, can also reduce the financial burden on individual authors. Expanding institutional funding mechanisms and internal grants to cover APCs would alleviate economic barriers and encourage broader participation. Additionally, enhancing the role of the repositories to increase OA visibility and dissemination with a cost-effective approach.

Looking ahead, this study provides a foundation for developing institutional-level OA assessment methods. It also suggests directions for future research exploring faculty attitudes, perceptions, and decision-making processes related to OA publishing. Understanding disciplinary differences in OA adoption will be crucial, as publishing norms and funding structures can vary significantly across fields. Such investigations can guide targeted support strategies aligned with the specific needs of diverse academic units. By acting on these insights, UH can reinforce its commitment to open access, amplify the reach and impact of its research, and contribute to a more equitable and sustainable scholarly communication ecosystem.

Conflict of Interest Statement

The author(s) declare that there are no conflicts of interest regarding the publication of this paper.

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