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## RESEARCH ARTICLE

# Assessing the Value of Subscription Journal Packages and Open Access Journal Articles in a Community College Context

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## ABSTRACT

**Introduction:** Academic libraries are facing two trends: the rising cost of journal subscriptions—the ongoing “serials crisis”—and the increasing availability of scholarly journal articles through free, open access channels.

**Methods:** This study analyzed the bibliographies from 116 research projects created by students across disciplines at a small community college and classified citations to journal articles based on the simplest way students could have accessed them.

**Results:** More than 60% of the scholarly journal articles that students used are available to them for free, and an additional 18% are available through state-sponsored database subscriptions available to any Massachusetts resident. Only 17% of the journal articles used were available to students solely through the library’s database packages, and more than half of those articles were used by students in the associate degree of nursing (ADN) program.

**Discussion:** These findings call into question the value of expensive subscription databases to community college libraries and suggest a pattern of diminishing return on investment and value. The trend toward cancellation of “big deal” journal packages at large institutions addresses similar concerns, although the dynamics are somewhat different at small institutions.

**Conclusion:** The paper concludes by suggesting some steps that small academic libraries might take to adapt to this changing publishing environment, in the areas of collection development and information literacy instruction, in order to better serve students.

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## IMPLICATIONS FOR PRACTICE

1. The growth of open access journal publishing calls into question the value of the large, one-size-fits-all journal packages that still form the core of most library serials collections.
2. For institutions serving early undergraduates, investing in good search tools may bring more value to the student than increased journal subscriptions.
3. When analyzing subscription packages, libraries often rely on statistics such as download counts, which fail to account for the fact that much of the content in those packages is available through green or gold open access channels.

## INTRODUCTION

This study addresses the intersection of two longstanding trends in scholarly communication. The first is the serials crisis, in which the costs of academic journal subscriptions continue to rise at a rate faster than inflation, straining library budgets (Crawford, 2014, p. 5). The second is the rise of open access publishing in its various forms, with data from Piwowar et al. (2019) indicating that at least a third of scholarly journal articles are currently published in an open access format and predicting that that proportion will continue to increase in coming years. Combined, these two trends suggest that, every year, libraries spend more on journal subscriptions that offer less unique content to our users, who are in turn increasingly accustomed to an open access publishing environment. In recent years, a number of large, research-intensive institutions have addressed these trends by canceling some so-called “big deal” subscription packages—those that include a single publisher’s entire catalog of journals—that they may have considered essential in the past (Nabe & Fowler, 2012, 2015; Ohler et al., 2020; SPARC, 2022). Our data suggest that community colleges, even though they subscribe to different products, have smaller budgets, and serve different research needs, may also play a role in moving away from the large, bundled subscription packages that libraries have relied on for several decades and toward new research and teaching models that center open access content.

Smaller institutions, and particularly community colleges, often cannot afford “big deal” packages, subscribing instead to curated packages from third-party vendors, and yet the pattern of diminishing returns persists. This study examines the changing value proposition of such bundled subscription packages at one small institution. By compiling a sample of journal articles that students used in their academic work in 2019 and 2020 and determining which of those articles students can access for free, we can get a sense of the value that our subscriptions bring to students on our campus. These data in turn point to two larger questions: When do the twin

trends of the serials crisis and the open access movement cause us to change the way we subscribe to journals? And when should instruction librarians begin relying on open access resources as the standard in our teaching and one-on-one work with students, rather than as an anomaly?

The context for this work is Greenfield Community College (GCC), a public 2-year institution in rural Western Massachusetts with a full-time enrollment hovering near 1000 and an academic program focused on liberal arts and professional programs. As a teaching-oriented institution, our campus has a specific set of research needs. First, faculty research is limited: while a small number of faculty members choose to publish original work, it is not an expectation for tenure and promotion, and the workload, at five courses per semester for full-time faculty, leaves little time for research. Second, our early undergraduate students are still developing foundational research skills such as how to identify and navigate a scholarly journal article. As such, they need ready access to high-quality examples of scholarly work across disciplines but only rarely need to read every article published on a given subject.

As a small institution, GCC cannot afford subscriptions to the flagship “big deal” packages that major publishers such as Elsevier and the American Chemical Society offer to larger, research-oriented institutions. Rather, most of our serials subscriptions come to us through mid-sized, general-interest bundles offered by third-party database vendors like EBSCO, Gale, and JSTOR. This type of subscription database has received little scrutiny in the literature, but it shares many of the drawbacks that previous authors have identified in publisher “big deals,” including a lack of flexibility in selecting individual titles (Lemley & Li, 2015, p. 2), rapidly increasing prices (Poynder, 2011), and a large proportion of low-quality journals (Shu et al., 2018). Compounding these issues, our subscription choices are somewhat constrained as a small, underfunded public institution; we receive several database packages for free as a member of the Massachusetts Library System and also spend about 10% of our non-staffing budget on a large package of general-interest databases negotiated through the Massachusetts Commonwealth Consortium of Libraries in Public Higher Education Institutions (MCCLPHEI). Additionally, for the past few years, we have spent around 30% of that budget on subscription packages that we select as an individual institution. Prices for these packages rise every year while our budget has remained mostly flat; as at most institutions, each budget cycle involves hard decisions, and every dollar spent on subscription packages cannot go toward discovery tools, resources to support particular programs, monographs, or title-by-title serials purchases.

According to the data we collected as part of this study, only 16.7% of the articles that students cited in their research were available to them exclusively through GCC library subscriptions. A total of 56.7% of the articles they cited, in contrast, were available through open access

channels, 4.5% were available for free elsewhere, and an additional 17.7% were available through statewide database subscriptions. This offers a strong indication that the subscription packages that we purchased for students in 2019 and 2020 did not bring a lot of value to our library or our students. The findings have already led the GCC library to invest more heavily in good, usable discovery tools in favor of subscriptions and will have long-term implications for our collection development strategy.

## LITERATURE REVIEW

Relatively early in the history of electronic journal publishing, Frazier (2001) coined the term “big deal” to describe a phenomenon in which publishers began to offer their complete journal catalogs to libraries at a reduced price. In spite of Frazier’s warnings about the prevalence of low-quality journals in these packages, the rapidly escalating prices, and the ever-increasing power of a few publishers, over time the vast majority of academic libraries adopted the bundled subscription model in one form or another. While Frazier and others (Bergstrom, 2010; Edlin & Rubinfeld, 2004; Shu et al., 2018) point to increasingly monopolistic practices within the publishing industry to explain this transition, the “big deal” model has also allowed libraries to cope, at least for a time, with the core problem of the serials crisis: the explosion of both costs and sheer number of journals since the 1980s (Bosch et al., 2022; Fire & Guestrin, 2019, p. 1).

The emergence of large subscription bundles in turn further complicated an already complex market for scholarly journals. Scholarly journals are not commodities; each is unique, some are more important than others, and certain titles are indispensable for scholars and students in particular fields of study. Demand for top-tier journals is inelastic, and libraries act as intermediaries between the publishers and the audience, who are often unaware of the costs associated with access (Shu et al., 2018). While “big deal” bundles have lowered the cost per journal title for libraries and given users access to more titles (Ware & Mabe, 2015, p. 9), a large number of those journals are low-quality, seldom used, and of dubious value to the institution: “filler,” as Shu et al. (2018, p. 976) bluntly put it.

Debates among librarians about the value of “big deal” subscription packages have raged from the beginning. Opponents of “big deal” packages (Bergstrom, 2010; Frazier, 2001; Gagnon, 2017; Mongeon et al., 2021; Shu et al., 2018) cite systemic problems such as high overall costs, high annual cost increases, the incentive to include low-quality titles, and the shifting of curatorial responsibility from librarians to publishers. More pragmatically, other scholars (Botero et al., 2011; Jurczyk & Jacobs, 2014, p. 620; Lemley & Li, 2015) tend to focus on the real benefits of the model, including access to a large number of titles and the administrative efficiency of bundled subscriptions. At the heart of these debates lies an ever-evolving set of

methods that librarians use to judge the value of both titles and journal bundles to their institutions and make collection development decisions. In addition to journal-level bibliometrics such as impact factors (Dong et al., 2005), librarians have developed a variety of ways to gauge the local value of subscriptions on their campuses, including download counts, citation counts in faculty publications, and analysis of overlapping content between packages, as well as faculty surveys and the judgment of local subject specialists (Mongeon et al., 2021; Sjoberg, 2017).

Of these methods, download counts, or “successful full-text article retrievals” (SFTARs), are the most straightforward and easily accessible, with most publishers adhering to the standard reporting practices established by the nonprofit COUNTER organization, established by the International Coalition of Library Consortia (COUNTER, 2023; Blecic et al., 2015, p. 179–180). Lemley and Li (2015) have used COUNTER report data to determine the cost of each SFTAR at their large institution to be approximately \$6.00 across their “big deal” subscriptions. However, as an illustration of the difficulty of interpreting even relatively straightforward metrics when making decisions about journal subscriptions, research (Bucknell, 2012; Wood-Doughty et al., 2019) suggests that many publishers continue to overcount usage on their platforms in spite of COUNTER’s standards. Even assuming that publishers are reporting in good faith, aggregated download counts and cost-per-SFTAR measure only what is displayed on a user’s screen, giving us no sense of whether that content was useful to the user, something that librarians can only estimate by counting faculty citations and gathering qualitative feedback about journals and packages (Dewland & Minihan, 2011). Additionally, usage metrics for large bundles can be deceptive because the quality and utility of individual journals within a bundle varies widely. A number of studies (Blecic et al., 2013; Enoch & Harker, 2015, p. 286; Schöpfel & Leduc, 2012) in fact indicate that journals in “big deal” packages adhere, roughly, to the Pareto Principle, meaning that 80% of usage comes from roughly 20% of titles, confirming Shu et al.’s (2018, p. 967) notion that these packages contain quite a bit of “filler” that libraries would not choose to purchase outside of the bundle. Among the benefits of journal bundles, they were supposed to ease the administrative burden of managing individual subscriptions (Lemley & Li, 2015, p. 2). Although this may be true in some respects, it is also the case that the continuous process of selection, management, and assessment of these bundles in the context of a particular institution is labor intensive, requiring both qualitative and quantitative methods and a significant commitment of staff time to do well (Dawson, 2015; Enoch & Harker, 2015, p. 284).

In recent years, a number of large academic libraries have decided to cancel their big deal packages with publishers, a trend tracked by the open access advocacy organization SPARC (2022). A number of authors have documented first-hand experiences with the cancellation process (Barton et al., 2018; Nabe & Fowler, 2012, 2015; Ohler et al., 2020). Experiences have

varied across institutions and contexts, but Cooper and Rieger (2021) conclude that, in general, for researchers and students, big deal cancellations have “little negative impact in the short term.” Both Ohler et al. (2020) and Nabe and Fowler (2015) support this notion by noting that interlibrary loan requests for journals from canceled big deal packages remain quite low compared to the SFTAR statistics pre-cancellation, suggesting again that SFTAR numbers do not accurately represent demand. Unfortunately, the vast majority of research on subscription packages takes place at large, research-intensive universities, and only concerns publisher “big deals.” The existing literature largely fails to consider the needs, challenges, and budgetary constraints of community colleges. In this study, we hope to begin to fill that gap in the literature.

## METHODS

Our research builds on the previous efforts to determine the value of library subscription packages described in the previous section. We do so by directly measuring the citations that early undergraduate students, the GCC library’s primary constituency, use in their major research projects. In this way, we make an effort to judge not just the value of a particular journal but the value of our library subscriptions as a whole in comparison to the range of scholarly articles that are available to students through open access channels. Although the methods employed are labor intensive and may not be feasible for every academic library’s day-to-day collection development, the authors hope that the results will provide a snapshot of how library resources at a small college compare to existing open access resources.

We made use of simple document analysis techniques to determine the types of resources that GCC students cited in their research papers and projects. After gathering student bibliographies from across campus, we identified individual citations to academic journal articles. Taking each citation individually, we conducted a series of searches to determine the simplest path a GCC student could use to access the article in question. Then, we classified each article into categories, again based not on how the student actually accessed the article, which we have no way of knowing, but on the simplest path a student might have used to access it, according to its availability in our collections and in open access repositories.

To assemble the sample, we began with a list of full-time GCC faculty, divided this list in half at random using the RAND function in Microsoft Excel, and approached one group in the fall semester of 2019 and the second in the fall semester of 2020. Faculty in both groups were asked whether they assigned significant research projects, defined as any paper or project in which students typically cited five or more sources. In total, we approached 41 faculty members over the course of the academic year; of these, one failed to respond, two declined to participate, and twenty-five assigned no significant research projects in their designated

semester, leaving thirteen faculty members who met the criteria for inclusion and were willing to participate. These 13 faculty members identified the course sections that included major research assignments, and, after a thorough explanation of the study’s aims and privacy practices, we asked each student in these sections for informed consent to examine their final bibliographies, which we collected from the instructor at the end of each semester; three of these 13 faculty members did not submit any bibliographies including journal articles. Finally, we eliminated work by students under the age of 18, who are not able to grant informed consent, as well as any bibliographies that did not contain citations to journal articles.

The final sample included 310 citations to journal articles drawn from 116 bibliographies in 20 course sections across eight academic departments in the natural sciences, social sciences, humanities, and health care occupations. Of those 310 citations to journal articles, 180 came from students in the 2-year associate degree in nursing (ADN) program. The ADN students make up only about 8% of GCC’s full-time equivalent enrollment, but their program requires them to complete rigorous research assignments each semester, and they are our most active library users.

It is worth noting that the arrival of the COVID-19 pandemic in the spring of 2020 had a significant impact on our sampling and data collection. GCC moved to all-remote instruction in early March of that year, and this transition was taxing for both students and faculty. As a result of the pandemic, we chose not to collect data in the spring of 2020 as anticipated, and did so in the fall semester instead. Because of the online-only environment, participation rates were significantly lower in 2020, as illustrated in Table 1, although some of that discrepancy is also due to the fact that bibliographies for the ADN program were collected in the fall of 2019 based on the random assignment of faculty to the two groups.

After collecting and anonymizing the bibliographies from both semesters, we followed a procedure to determine how a GCC student might access the articles in question. Prior to coding the real student citations, the two researchers tested inter-rater reliability by each coding a test

	Fall 2019	Fall 2020	Total
Disciplines	6	3	8 <sup>1</sup>
Instructors	7	3	10
Sections	10	10	20
Students	81	35	116
Citations	223	87	310

<sup>1</sup> One discipline, English, was represented in both semesters.

**Table 1.** Breakdown of the full sample by semester

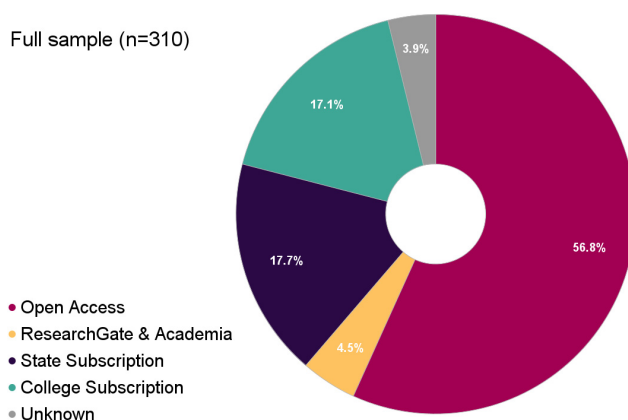


set of citations drawn from previous student work that was not part of the sample. We achieved 100% agreement on those test citations, indicating that our procedures were clear and our categories were unambiguous. Once again, our goal was not to identify how an individual student actually accessed a particular article, but rather to determine the simplest access pathway, defined as the pathway that would present the student with the fewest barriers. In this way, we sorted each article into one of the five categories defined below.

- **Open access:** An article that we found to be freely available through Google Scholar or the since-defunct open access search platform 1Findr. Checking the copyright status of each article would have been cumbersome if not impossible, so we chose to conflate an article's presence on one of these platforms with the open access label. In addition to articles from "green" open access journals and "gold" open access articles in hybrid journals, we also included articles with pre- or post-prints in institutional repositories in this category.
- **Free on ResearchGate or Academia.edu:** An article that is freely available to anyone with an Internet connection but that is more questionable in terms of copyright status. The legal barrier of copyright, as well as the information the student must give to these for-profit platforms in exchange for access, constitute the barriers in this category.
- **Statewide subscriptions:** The Massachusetts Board of Library Commissioners (MBLC) purchases a package of subscriptions for all Massachusetts residents (MBLC, 2016). These subscriptions integrate with Google Scholar, and anyone in the state can access them without a login using IP-based geolocation. As part of the procedure, we searched Google Scholar twice, once with a virtual private network (VPN) that made us appear to be out of the state, and once with an in-state IP address, in order to confirm which links were open access and which were state subscriptions. The barrier in this case involves the need to be in the state of Massachusetts when accessing the articles; given that we have many students from Vermont and New Hampshire, as well as some all-online students out of state, this is not guaranteed.
- **College subscriptions:** These are articles that are only available to the student through the library, using GCC's login information. In order to access articles in this category, a student would either need to be on campus or to have, and know how to use, their library card login information.
- **Unknown:** We were unable to identify an access pathway for 12 articles in the sample, or 3.9%. We assume that students who found these articles had access to library collections at another institution, accessed them through interlibrary loan, purchased the articles individually from publishers, or accessed them illegally through SciHub, the #ICanHasPDF hashtag, or something similar.

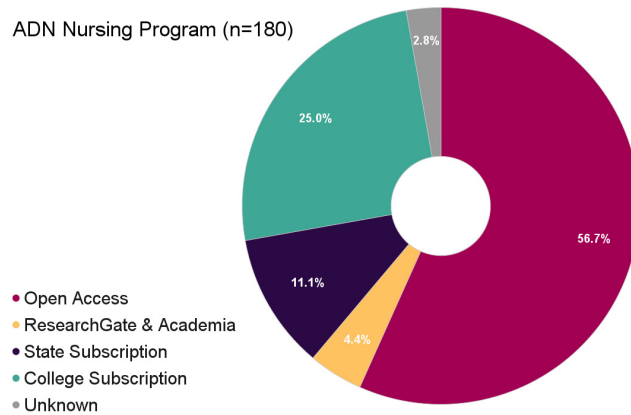
## RESULTS

Given the rapid growth in open access publishing in recent years, we expected to find that a large proportion of the articles that students cited would be available through open access channels. As Figure 1 illustrates, more than half, or 56.8%, of the articles that students chose to use fell into our open access category. Students could access an additional 4.5% for free through ResearchGate or Academia.edu, and 17.7% through the state databases by way of IP-based geolocation. In total, nearly 80% of the articles were available to most students through a simple Internet search, without resorting to library logins, whereas a mere 17% (53 articles in total) were only available to students through GCC library subscriptions.

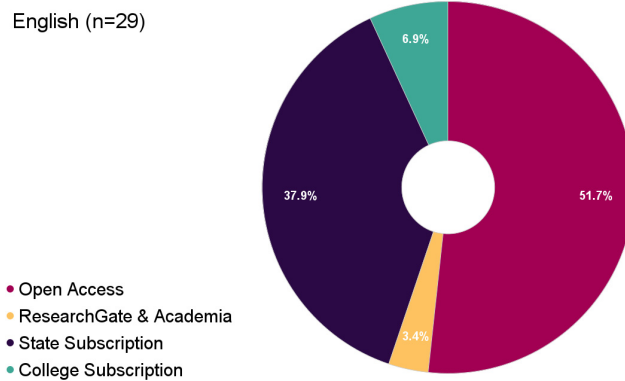


**Figure 1.** Results from the full sample ( $n = 310$ )

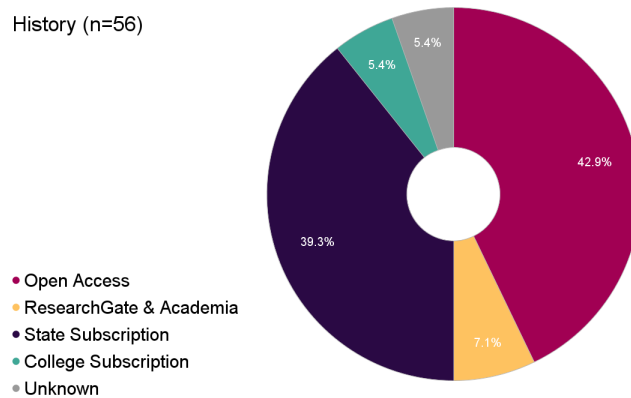
The results are inconsistent across disciplines, although opportunities for cross-disciplinary comparison are somewhat limited. Five of the eight disciplines in the sample were represented by only one course section and/or less than five total bibliographies that met the criteria for inclusion. An analysis at that level of granularity would both introduce privacy issues in that it might be possible to identify individual instructors or even students and would be of low value because of the extremely small sample sizes. For these reasons, we chose to look at only three disciplines in depth: The ADN nursing program, which provided us with 56 bibliographies from two course sections totaling 180 citations in the sample (Figure 2); English, which gave us 18 bibliographies from six course sections, totaling 29 eligible citations (Figure 3); and history, which provided 22 bibliographies from five course sections, totaling 56 citations (Figure 4). As a result of randomization between semesters, bibliographies from the ADN program were collected in the fall of 2019, those from the history department were collected in the fall of 2020, and those from the English department were collected in both semesters.



**Figure 2.** Results from a subsample, including only bibliographies from the ADN nursing program (n = 180)



**Figure 3.** Results from a subsample including only bibliographies from English classes (n = 29)



**Figure 4.** Results from a subsample including only bibliographies from history classes (n = 56)

Low student participation rates during the COVID-19 crisis accounts, at least in part, for the small sample sizes from the latter two departments.

The ADN program is by far the most research-intensive academic offering at GCC, and students in that program also used the highest proportion of articles that are only available through library subscriptions, at 25%. Interestingly, students in the ADN program also made use of open access sources at a rate similar to that of the full sample, 56.7%, and higher than students in English and history. The higher numbers in the open access and library subscriptions categories reflect a low proportion of articles in the ResearchGate and/or Academia.edu (4.4%) and state subscriptions categories (11.1%), which perhaps reflects the general-interest nature of the state databases and the lack of technical information in nursing.

Students in both the history and English courses cited very few articles that could only be found through library subscriptions: only 6.9% for English and 5.4% for history. The bulk of the articles that these students chose, almost 40% in both cases, were available through Massachusetts state subscriptions. Again, this finding reflects the fact that state subscriptions are selected for a general audience, rather than a technical audience. In the case of the history program, the proportion of articles available for free through ResearchGate and Academia.edu (7.1%) even exceeded the proportion available only through library subscriptions. To reiterate, it is very likely that these students made use of the library database to find their articles, and, in fact, a majority of the students in these sections received database-focused library instruction during the semester. However, even if they did use a library database as a search tool, the content that they eventually found and chose was available to them on the open Web, with fewer barriers.

Returning to the full sample, significant variation in the data also exists between the two semesters (Figure 5). In 2019, pre-COVID-19, students found more articles that we classified as open access, 60.5% in 2019 versus 47.1% in 2020, as well as more sources only available through the library subscriptions, 20.6% versus 8%. The proportion of articles available through state databases increased significantly in 2020, from 10.3% to 36.8%, whereas the ResearchGate and/or Academia.edu and “unknown” category categories remained relatively stable and relatively low. As noted earlier, data collection for the ADN program took place in 2019; the particular behavior of those students and the fact that those students contributed 81% of the sample in that semester goes a long way to explain the year-to-year differences. It is conceivable that the COVID-19 crisis and the transition to remote instruction played some role in this year-to-year variation. However, in order to draw such a conclusion, we would need a more controlled data set, perhaps including year-to-year data within a single discipline or taught by the same set of instructors.

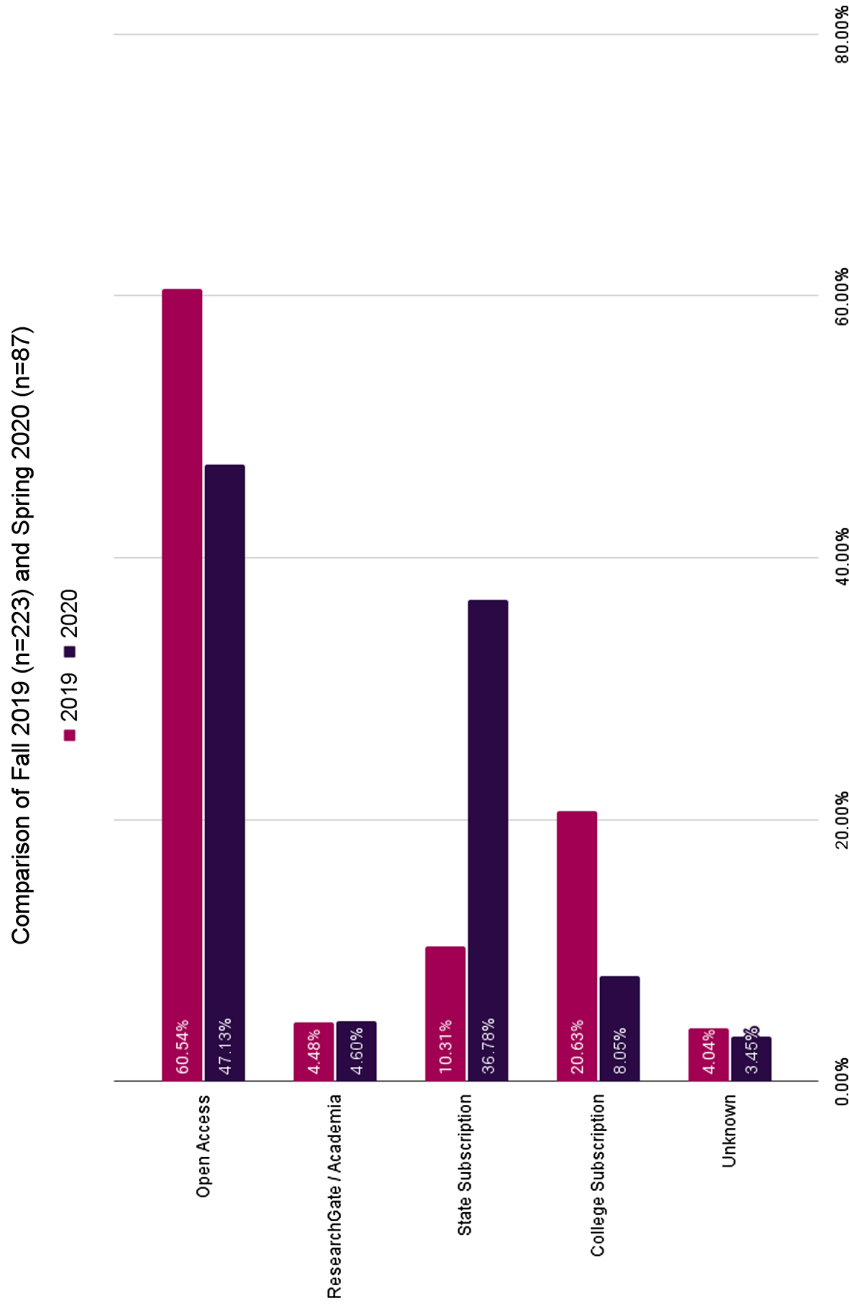


Figure 5. Comparison of results from the complete sample for fall semester of 2019 and fall semester of 2020

## DISCUSSION

This research has given GCC librarians significant insight into our campus and our collections, and it has already led to a number of changes in how we operate. Perhaps the most striking finding does not require a deep analysis of the data: student research in the traditional “term paper” mold, involving multiple sources and scholarly journal articles, is not widespread across campus. Rather, it is concentrated in a few disciplines and a few courses, suggesting that we should spend more of our limited resources for scholarly materials building collections in those research-intensive areas. This is particularly true for highly technical fields such as nursing, where subscriptions are expensive and open access publishing is not the norm, but it also may apply to areas such as history where students do significant research.

Aside from that general observation about our campus, our findings make it clear that the value of our subscription packages is limited. Even though our information literacy instruction program guides students toward library search tools, a large majority of the sources that students find useful enough to cite in their work are available to them for free and without the barrier of an institution-specific library login. In contrast, our institution pays nothing for open access publications and does little instruction to support their use, even though they can meet more than half of the research needs of our students. Our students are reaping one benefit of open access that the [Right to Research Coalition \(n.d.\)](#) and other advocates have promised: that open access publishing levels the information playing field for students at small and under-resourced institutions such as ours, allowing them to have access to a greater number and a wider variety of research materials than our modest budget could ever support under a traditional publishing model. This current study did not examine the search behavior of individual students, but a future study on this subject could determine whether students are bypassing library search tools in favor of the open Web or are finding open access content in library databases.

This research has implications for collection development and budgeting. As a community college, we do not have access to the comprehensive “big deal” packages that publishers offer. Additionally, the fact that we get a number of our subscriptions through the state or through consortial buying with much larger institutions means that we have limited power to cancel subscriptions in the short term, as the larger institutions on SPARC’s (2022) cancellation list have done. However, we do have some ability to shift priorities and redirect resources in the best interest of our student researchers. First, and as noted earlier, when evaluating subscriptions and subscription packages, we can prioritize specialized products in areas of high research interest among students, such as nursing and history, even if these packages contain fewer journal titles for the same price. Second, we can begin to direct money away from subscriptions entirely. As the most immediate example of this strategy, in 2021, we used data from this

research to support the purchase of a discovery layer, which we had never had previously. Although this choice did not involve canceling any subscriptions—we were able to use COVID-19 relief funds and ask for a small budget increase over the next few years—it is likely that we will need to do so to support the discovery layer in the future, reflecting a choice to prioritize findability and usability within our collection over sheer number of journal subscriptions. When choosing a discovery layer, we also weighed the extent to which various products on the market integrate open access sources more heavily than we might have prior to seeing these results. Beyond the discovery layer, it is possible that, in the future, we will redirect more of our budget to buy monographs at a level appropriate for our students, which, unlike our digital subscriptions, we would own in perpetuity and be able to share with other libraries in our regional library network. Finally, moving forward, we can use this research in conversation with our consortium, both to advocate for a purchasing strategy that factors in the availability of open access content and perhaps even as a justification for lower prices in negotiations with publishers.

The research also suggests interesting possibilities for information literacy instruction on our campus. Our teaching varies over time and in different contexts, but, in general, when we discuss scholarly articles we steer students toward library search tools, library subscriptions, and a traditional controlled-access, subscription-oriented understanding of scholarly publishing. Before implementing our discovery layer, we looked for open access versions of articles only when we could not find them in our collection. The current data, however, suggest that the opposite approach might serve students better: introduce open access search tools as the first tool of choice, with library subscriptions as an additional resource (along with interlibrary loan) when the students need a particular article or need to research a particularly technical subject. Such an approach would have the added benefit that, unlike subscriptions, students will still have access to open access search tools after they are no longer in college. However, going forward, we and other community college librarians will need to balance the potential benefits of such an “open access first” approach with the need to prepare students to navigate the library-specific tools that they will use for more in-depth research at 4-year institutions after transfer. By combining search results from our library collection, from green and gold open access journals, and from institutional repositories, our new discovery layer will make the process more seamless for students and may keep us from having to prioritize open access or subscription materials for the time being. However, it also obscures the bifurcated nature of the current scholarly publishing world, something that students will need to understand and engage with as they do more sophisticated research.

This research was eye-opening for our library staff, but it is worth noting that it also suffers several important limitations. Although we began the project with an expectation that the final sample size would be relatively small, the low participation rates in the second round of data

collection due to the move to remote learning limits our ability to generalize across the campus. For example, it was our hope at the beginning to extrapolate a rough cost-per-student-citation statistic for the campus as a whole, but the low participation in 2020 introduces too much noise into the data to do so. Additionally, the introduction of the discovery layer in 2021 may have changed student research habits; now that library subscriptions are easier to access and navigate, we might find higher levels of usage for articles that are only available through library subscriptions. A post-discovery follow-up study with a similar design could reveal important points not only about open access but also about those behavior changes.

## CONCLUSION

When it comes to journal subscriptions, libraries at small community colleges lie at the bottom of the food chain. Our collections budgets are scant compared to our 4-year peers, who are also struggling with the serials crisis, and only a limited number of subscription packages exist that we can afford. Our practice of purchasing many products at the state level and the limitations in staff time and expertise also limit our ability to evaluate and select the best resources for our students. Additionally, librarians at institutions such as ours are responsible not only for helping students do their best work while they are with us but also for preparing them to succeed at 4-year transfer institutions that will have different tools and different approaches to information literacy. In spite of these limitations, community colleges are important actors and stakeholders in the larger research and scholarly communication world. We educate 43% of students in the United States, and our students are the most diverse of any higher education sector (Ma & Baum, 2016). It behooves us to recognize the value that open access publishing brings to our institutions and consider that value as we make deliberate decisions about our collections, subscriptions, and teaching. Research specific to the community college context is unfortunately scant in many areas, including this one; such research is crucial as we continue to recreate and redefine the culture of scholarly communication in collaboration with our colleagues at 4-year institutions.

The results of this study illustrate the real effects that changes to the scholarly publishing system, with an increased emphasis on open access, have on the value of our library's subscription packages to students. We began by hypothesizing that increasing open access publishing leads to a pattern of diminishing returns, in which large subscription packages—"big deal" or otherwise—have less to offer our students each year, even while the cost of those packages continues to climb. We found this pattern of diminishing returns to be much more advanced than we anticipated, with only about 17% of the research materials that students need for their major research assignments available exclusively through our library subscriptions. The declining value of our subscriptions is, perhaps paradoxically, a positive development for students, and it illustrates the real value that our small institution derives from the work and



investment that a generation of open access advocates have put into developing and funding the infrastructure for open access publishing. The paradigm of large, bundled subscriptions must now compete with an open access publishing model that offers our students more equitable access to a wider variety of materials, all with fewer logins and technical barriers, than our modest subscriptions budget ever could. Open access is good for students and particularly good for students at small, under-resourced institutions. Thus, as student-centered librarians, it is incumbent upon us to embrace and adapt to these changes.

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