Beyond the walls of the citadel

Effective library outreach to graduate students

David Moles
510 Human Information Behavior
Xiaotong Du
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ABSTRACT

Graduate students are a complex, diverse population that nonetheless share many commonalities in their information behavior. Many of the information barriers they face could potentially be overcome with help from libraries and librarians, but despite offering a variety of programs that could be useful to students, libraries have struggled to engage them in these programs.

This paper surveys the literature on graduate student information needs and behaviors and on library outreach to graduate students from 1997 to the present, following a methodology adapted from a meta-analysis performed by Catalano (2013) relying primarily on a search of Library Information Science and Technology Abstracts (LISTA). Some twenty such articles are considered, including Catalano and several works included in Catalano's meta-synthesis, but also approximately a dozen newer papers that update Catalano's conclusions and address issues such as information anxiety and information self-efficacy Catalano does not consider.

Graduate students face many information barriers, including time pressure, information overload, gaps in skills and awareness, information anxiety, and low information self-efficacy, many of which could potentially be alleviated by library or information literacy instruction, but many of which also make it difficult for libraries to provide that instruction.

I propose, therefore, to integrate library and information literacy instruction into core graduate curricula, tailored to the needs of specific disciplines and specific programs—a non-trivial undertaking, but one that if done well could allow libraries to address graduate students' information problems more effectively than in the past.

> "You are in close contact, then, with your opposite numbers in the city," I said.
>
> The old man stroked his beard. "The closest, for we are they. This library is the city library, and the library of the House Absolute too, for that matter. And many others."
>
> "Do you mean that the rabble of the city is permitted to enter the Citadel to use your library?"
>
> "No," said Ultan. "I mean that the library itself extends beyond the walls of the Citadel. Nor, I think, is it the only institution here that does so. It is thus that the contents of our fortress are so much larger than their container."[1]
>
> —Gene Wolfe, *The Shadow of the Torturer*

INTRODUCTION

The objective of this paper is to characterize the information behaviors of graduate students—primarily, those behaviors that relate to and affect their academic work—and to propose some ways academic libraries might be able to better meet graduate students' specific information needs and overcome both the barriers faced by graduate students in seeking information, and the barriers faced by libraries in reaching graduate students. The primary focus is on students in masters and doctoral programs in the arts and humanities, in the social, physical, and life sciences, and in professional fields including engineering, library and information science, and the law.[2]

Graduate students are a demographically diverse population, fully reflective in the United States—if not entirely representative—of the national population (NCES, 2023). International graduate study is also common, with e.g. roughly 13% of U.S. graduate students being non-U.S. residents (NCES, 2023).[3] Graduate programs also span the full range of intellectual and professional disciplines, from fine arts, to humanities, to social, life, and physical sciences, to business and law, attracting students with widely varied professional and personal goals and equally varied personal, professional, and educational backgrounds. A significant fraction of graduate students are full-time distance learners, with the majority even of nominally on-campus students making at least some use of distance instruction (NCES, 2023). Many graduate students are disabled (NCES, 2017).

They are, in short, as complex and as far from monolithic as most library patron populations. Nonetheless, a survey of the literature reveals many commonalities among graduate students in their information-seeking behavior, in their interactions with faculty, peers, and librarians, in their use of (or failure to make use of) library resources, and in the barriers that impede them from seeking and using information effectively. Many of these barriers could potentially be overcome by effective instruction in library skills and information literacy, but study after study shows that simply offering such instruction is insufficient, just as simply offering library services is insufficient; that passive attempts to make students aware of library resources and instructional offerings via library websites and similar communications are ineffective.

I propose, instead, to integrate library skills and information literacy instruction into the core curricula of graduate programs, ideally as part of foundational, discipline-specific methodology courses. To accomplish this, libraries would have to overcome several barriers—not least, that the faculty teaching such courses and the faculty designing programs and making curriculum decisions are often as unaware or dismissive of what the library might offer as students themselves. Nonetheless, I believe it to be the most effective way of reaching graduate students—and, incidentally, of reaching both current and future faculty.

For the library to be as fully valuable to the university, and the world, as it can be, the library must extend beyond the library.

POSITIONALITY

I write this as a graduate student twice over, once in economic and social history (MSc., Oxford, 2000) and once in library and information science and in archives and preservation (MI, Rutgers, 2024). I am also White, middle-class by income, upbringing, and current wealth, middle-aged, fully abled, cis-male-presenting, married, a homeowner, and a citizen. I am, in short, writing from a position both of considerable privilege, and of considerable interest in the questions addressed by this paper. I recognize in myself many of the anxieties, bad habits, and sub-optimal information behaviors noted in the literature; I also have many highly developed coping mechanisms for these issues, and I recognize that I am considerably better positioned to benefit from a service of the sort proposed here than those who have less privilege, while at the same time having less need of such a service than many.

It would be a tragedy, perhaps a crime, for a service like this one to be implemented in such a way as to allow people like myself to benefit, while neglecting the needs of those for whom it would make the most difference.

LITERATURE REVIEW

Catalano (2013) provides a meta-synthesis of some 48 articles on graduate student information behavior, both qualitative and quantitative, published from 1997 to 2012, most identified by systematically searching Library Information Science and Technology Abstracts (LISTA) for relevant keywords, but with some selected from among those already accumulated by the author in the course of her research. The studies Catalano identifies span a range of research methods, including (most commonly) surveys and interviews, as well as focus groups, analyses of papers and reference lists, and structured UX task analyses. Sample sizes and sampling methods likewise vary, from a purposive sample of six subjects (Green & Macauley, 2007) to a random sample of 1,056 (Friedlander, 2002), with purposive sampling being the most common. Catalano does not appear to have assessed the studies' choices of theoretical framework, but these likewise vary, from Friedlander (2002), which being primarily a set of descriptive statistics includes no explicit model or theory, to Sadler & Given (2007), which takes an ecological psychology approach informed by Gibson' (1979) and Norman (1999).

Catalano approaches the question of graduate student information behavior from the perspective of reference service and library instruction, making her survey an ideal one for a paper focused on proposing an information service. However, it is worth investigating whether any of the behavior patterns identified by Catalano have changed in the intervening decade. As noted by Jordan (2013) in her evaluation of Catalano for *EBLIP,* the critical interpretive synthesis method used by Catalano is not necessarily as reproducible as other methods commonly used for systematic reviews of purely quantitative research. Nonetheless, Catalano's search process and criteria for inclusion are well documented, making it possible to approximately replicate at least those phases of her work.

Following Catalano, then, I searched LISTA for peer-reviewed articles matching keywords *information AND doctoral students OR post-graduates OR graduate students*, and subjects *information literacy*, *information-seeking behavior*,

information needs, and *information retrieval*.[4] Since the focus of this paper is to make a service proposal rather than to make a full synthesis of the research literature, I did not attempt a systematic analysis like Catalano's, but instead identified roughly a dozen papers of interest from among the following categories:

1. those that confirm the continued validity of Catalano's central observations;
2. those that identify some changes in graduate student information behavior since Catalano's time of writing, such as the now near-universal acceptance of (and preference for) electronic resources;
3. those that address intersectional issues not considered by Catalano, such as differences in graduate student information behavior among students of different backgrounds, or with different access to resources; and
4. those that seem to point to emerging phenomena in graduate student information behavior or emerging trends in research into that behavior not addressed by Catalano, notably library anxiety and/or information anxiety.

Many of these studies, as with the earlier Friedlander (2002), avoid any discussion of theory; examples of this type include Erfanmanesh et al. (2012), a statistical evaluation of a scale for measuring information-seeking anxiety, Van Kampen-Breit et al. (2017), an evaluation of library anxiety as a factor in student underuse of library resources, and Kavanagh & Barykina (2023), a survey of students' knowledge and use of library resources. Some, however, are more explicit, such as Katopol (2012), which applies the Cognitive Work Analysis framework to examine the cognitive behavior of Black students at a predominantly White university as knowledge workers seeking information and making decisions under structural constraints, or Awan et al. (2021), which uses a model of information encountering derived from Awamura's (2006) extension to Erdelez (2005).

I should note that this paper, and most of the literature reviewed, are largely concerned with the academic information needs of graduate students, and how libraries can better meet those needs. However, students do have other information needs, such as those related to health, safety, and, for international students, visas and travel (Gao & Kohnen, 2023); and those related to developing both academic skills such as writing (Stouck & Walter, 2020) and general life skills such as financial literacy (Lam et al., 2018). The fact that the

library literature largely seems to ignore students' non-academic information needs is interesting and seems to point to a possible gap in academic libraries' missions, or in their approach to fulfilling those missions.

ANALYSIS

Information seeking

Graduate students begin from a variety of sources when seeking information. Catalano (2013) identifies faculty, especially advisors and supervisors, as the most commonly cited resource for students when beginning a research project; reading lists or suggestions from advisors were also cited as a useful starting point for citation chaining. Oliveira et al. (2022) also note instructors as a source, both via direct consultation and via reading lists from coursework. However, Catalano also cites the open Internet as a frequent starting point, an observation repeated in later studies such as Katopol (2012), Van Kampen-Breit et al. (2017), Awan et al. (2021), and Kavanagh & Barykina (2023), as well as Oliveira et al.; Awan et al. also note the role of serendipitous encountering of scholarship-relevant resources during undirected web browsing (as distinct from task-oriented web searches), while Katopol and Kavanagh & Barykina each note the use of Google Scholar in addition to the Google general web search engine.

Several sources, including Katopol (2012), Catalano (2013) and Van Kampen-Breit et al. (2017), note students' use of library-provided journal databases, while Oliveira and Greenidge (2020) note the appearance and use of library guides and journal finders during the second decade of the 21st century. Katopol, however, describes students' use of journal databases as secondary to their use of the web, with journal databases and the library website primarily used for access rather than discovery. While Catalano cites several studies indicating a preference for library resources over the open web as more reliable, Katopol's respondents—Black students at a predominantly White university—found that the library often lacked resources on their subjects of interest, forcing them to look elsewhere.

Information sources and preferences

A consistent theme across the literature, from Katopol in 2012, to the various studies analyzed by Catalano in 2013, to Kavanagh & Barykina in 2023, is a

preference, increasing over time, for electronic resources, including both electronic journals and e-books. Some of Catalano's sources indicate a preference for print among some populations, such as education doctoral students whose previous academic experience had been largely with print (Green and Macauley, 2007), or social science students as compared to students in the physical and life sciences (Sadler & Given, 2007), but this phenomenon does not seem to be noted in later studies. This may be driven in part by the rise in distance learning,[5] with distance learners, as Oliveira et al. (2022) note, particularly reliant on on-line journals and e-books; but even Kavanagh & Barykina, whose respondents include more on-campus students than distance learners, report electronic journals, ebooks, and off-campus access to library resources as among the services their respondents rated most important.[6] That said, as Catalano notes, some fields in the arts and humanities are less suited to a digital transition, relying more on primary artifacts or on older texts unlikely to be digitized, and even Oliveira et al. note continued significant use of print books even among distance learners, with nearly 20% of their respondents still preferring print to electronic.

Information interactions

While graduate students often consult with faculty, as observed by Catalano (2013), Catalano notes that faculty themselves often lack information skills. Catalano also notes that some departmental cultures may better encourage students to consult faculty than others; Katopol's (2012) respondents found faculty often unavailable or of relatively little help, particularly when, as Black students at a predominantly White university, their research topics were outside the White mainstream of research in their field. Both Katopol and the studies analyzed by Catalano observed other students to be a particularly important resource, with Katopol's respondents particularly relying on other Black students, even Black students in other departments, in preference to White students perceived as unforthcoming. Another factor in preferring peers over faculty may be the sense of surveillance that Webster & Gunter (2018) note as an effect of assessment and of classroom power relations, which they found to drive students to communicate with one another outside official channels.

Most studies found graduate students to consult librarians rarely, if at all. Catalano (2013) identifies several studies describing students as avoiding librarians, a phenomenon also noted by Katopol (2012). A variety of reasons appear to contribute to this, from an assumption that librarians lack disciplinary

expertise (or, in the case of Katopol's respondents, that White librarians lack expertise in Black topics); to low expectations—an unawareness, for instance, that librarians might be able to suggest research avenues or help a student come to grips with the vocabulary of a discipline (Katopol); to an unwillingness to seek help from librarians due to library anxiety (Van Kampen-Breit et al., 2017), which both Catalano and Van Kampen-Breit et al. note as manifesting in an unwillingness to appear inept and a sense the student is wasting the librarian's time. Katopol also notes that a poor experience with a librarian not only can sour the student on library services, but can also lend credence to a student's preexisting sense of exclusion or suspicion of discrimination.

Information barriers

Time pressure

Katopol (2012), Van Kampen-Breit et al. (2017), and several of the studies analyzed by Catalano (2013) note time pressure as a significant barrier to students' ability to seek information effectively, in general, and to become aware of and make use of library resources, in particular. A sense of time pressure leads students to prefer the easily accessible resource over the highest quality resource (Catalano), and to orient their information-seeking toward identifying the minimal information needed to accomplish a task, rather than toward acquiring a holistic understanding of a discipline or of an intellectual problem (Katopol). Van Kampen-Breit et al. note that many participants in distance learning programs are working adults with many other demands on their time, leaving them little leisure to develop their academic skills, while Katopol notes that even non-distance-learners may find lack of time an impediment to visiting the library in person. Catalano also notes time pressure as a factor in students' failure to develop their information-seeking skills, with students showing a preference for familiar if inefficient search techniques over taking time to experiment with new techniques, and an unwillingness to allocate (scarce) time to (optional) library instruction, while Katopol sees time pressure as a barrier to students' developing skills and habits of information management—a short-term time savings with significant long-term costs.

Information overload

A related factor also noted by Katopol (2012), Van Kampen-Breit et al. (2017), and several of Catalano's (2013) studies, is information overload. Van Kampen-Breit et al. describe students as overwhelmed by the variety of information resources offered by the library—a variety that, as they note, has tended only to increase—while the volume of search results produced by searching these various resources, as well as the open web, was equally overwhelming, especially for students at the beginning of a program and as yet relatively unfamiliar with the discipline. Katopol describes students as having to sift through large result sets for a relatively small number of relevant sources, while at the same time anxious that the sources they were finding were insufficient to satisfy their professors. And both Katopol and Catalano note the intersection of information overload with time pressure as leading students to prefer familiar sources and abandon the collection of resources prematurely.

Gaps in knowledge, skills, and awareness

Both time pressure and information overload, as noted above, were identified as factors in preventing students from improving their information-seeking skills or becoming more knowledgeable about library resources. Students' lack of awareness of what resources are available to them is a recurring theme from Sadler & Given (2007), to Katopol (2012), to Catalano (2013), to Van Kampen-Breit (2017), to Oliveira et al. (2022). Distance learners are noted as being at a particular disadvantage with regard to awareness of library resources (Van Kampen-Breit), as are international students (Catalano), many of whom arrive with different expectations of the library and a different understanding of the role of the librarian than their local peers (Chen & Brown, 2012; Gao & Kohnen, 2023). Attempts by the library to inform students about library resources via electronic channels often fail due to what Sadler & Given call "inattentional blindness": students' failure to notice information in front of them when that information is not directly relevant to the task at hand. Meanwhile, Catalano, Oliveira et al., and Michalak et al. (2017) all note that students tend to rate their own information-seeking skills highly—often too highly, according to several studies analyzed by Catalano, leading to unexpected frustration.[7]

Anxiety and low self-efficacy

While library anxiety was a recognized phenomenon before Catalano (2013),[8] it does not appear as a factor in Catalano's meta-analysis, with Catalano mentioning anxiety only in passing. However, several studies more recent than those analyzed by Catalano discuss graduate student library anxiety, information anxiety, or information-seeking anxiety in more detail. Information anxiety (Katopol, 2012) and information-seeking anxiety (Erfanmanesh et al., 2012) appear to have been fairly recent coinages at Catalano's time of writing. Katopol's information anxiety expands on library anxiety to address anxieties beyond the library, in the use of not only library resources but other information resources, both human and electronic. Erfanmanesh et al. note several precedents for considering anxiety specifically during the information-seeking process, as far back as Kuhlthau (1991), as well as Mellon's library anxiety, but their work appears to be the first to attempt a quantitative assessment. Their analysis breaks information-seeking anxiety into several factors, including both library anxiety and anxiety about the search process, as well as aspects of technology and of topics and resources—all relevant to graduate students.

More than half of the respondents to Van Kampen-Breit et al. (2017) reported general library anxiety as a concern, while 70% reported a lack of comfort and confidence when using the library. Information anxiety, including but not limited to library anxiety, is a pervasive theme in Katopol (2012), intersecting with other sources of graduate student anxiety such as racial inequality and stereotype threat. Van Kampen-Breit and Catalano (2013), as previously mentioned, also note the unwillingness of students to appear inept when communicating with librarians, while Katopol notes stereotype threat as leading to a fear of revealing weaknesses that might be assessed as incompetence, both of which could be described as manifestations of anxiety. Erfanmanesh et al. (2014) find significant levels of information-seeking anxiety among assessed graduate students in Malaysia, while Naveed and Ameen (2017) find similar levels when applying the same assessment to graduate students in Pakistan.

Several studies also address graduate students' information literacy self-efficacy or information-seeking self-efficacy, i.e. students' belief in their own information literacy or their ability to complete information-seeking tasks. Where such belief is misplaced, this could be seen as related to the over-assessment of students' own skills noted by Catalano (2013), Oliveira et al. (2022), and Michalak et al. (2017). On the other hand, an unjustified lack of

such self-belief seems a likely product of (or factor in) information anxiety. Keshavarz et al. (2017) found their respondents to have generally high self-efficacy in their assessment and use of information, but relatively low self-efficacy when it came to identifying and locating information in the first place, a finding which might correlate with information-seeking anxiety. Hebert & Duet (2017) found graduating MLIS students, in particular, to report their search self-efficacy as increasing over the course of the program.

SERVICE PROPOSAL

Libraries use many methods to make information available to students, from online tutorials and research guides to courses in library instruction and information literacy. However, as noted above, multiple studies report the difficulty libraries have in making students aware of the services they offer, from students' reluctance to consult librarians, to the information overload and time pressure that makes students unwilling to allocate time for library instruction, and often unaware of libraries' attempts at outreach. What is most effective, according to both Sadler & Given (2007) and Van Kampen-Breit (2017), is building personal relationships between librarians and students—relationships which, according to Sadler & Given, can improve students' overall perception of the library and willingness to consult other librarians, not only those of their personal acquaintance—but absent chance encounters, these relationships do not often develop.

Oliveira et al. (2022), though, note that while less than half the students they surveyed had participated in library instruction, 60% of those who did participate did so through their coursework. What I propose, then, is to include instruction in library skills and information literacy as part of coursework for all graduate students, ideally in such a way as to make it impossible for students to avoid, and early enough on in their programs of study that the skills they learn, and the relative comfort and familiarity with their institutions' libraries and librarians that they develop, can serve them throughout their studies. The best opportunity to do this would be in a foundational methodology course specific to each discipline and program, so that librarians can work with faculty to identify discipline-specific, program-specific information problems and related resources, and so that making use of the library becomes part of how students learn to approach work in their fields.

Implementing such a program, however, presents several difficulties. As noted, faculty themselves are often less information literate and less skilled in library use than librarians would like; it may be difficult to convince faculty of the value of this kind of instruction. And even if the value is acknowledged by individual faculty, it still may be difficult to convince departments that face their own problems of time pressure and information overload, as well as budget pressures, administrative compliance issues, and other competing priorities, to devote time and resources to this work, especially if it means reformulating core curricula—and in many cases introducing foundational methodology course requirements that have not previously existed. Furthermore, if a library instructional program is implemented, it must be done carefully and well to be effective; Erfanmanesh et al. (2014) note that among the students they surveyed, information literacy instruction did not appear to alleviate information-seeking anxiety, while many of the students surveyed by Van Kampen-Breit (2017) found that learning foundational research methods—albeit in a course without embedded library instruction—increased their library anxiety and their information-seeking frustration. Information literacy pedagogy, as Todd (2017) observes, is not yet a well-established field, and information literacy instruction still has much to learn from educational theory; a poorly implemented program could negatively affect library-department relationships and the image of the library in general.

There is also no simple way to make White librarians more sensitive to the information needs of Black students, the information barriers Black students face, and cultural differences between Black students and White librarians, as catalogued by Katopol (2012), and likewise citizen librarians as regards the needs, barriers, and cultural differences of international students (Chen & Brown, 2012; Gao & Kohnen, 2023); or, for instance, to make libraries and library services more accessible to disabled students (Kumbier & Starkey, 2016). Webster & Gunter (2018) note that even in an information literacy program with liberatory intentions, the course structure and the fact of assessment tends to reinforce the authority of faculty and of the institution; the sense of surveillance reported by Webster & Gunter's respondents seems likely to work against the goal of building trust between students and librarians, particularly if student-librarian interactions or student library-use tasks are part of the course grade. Careful attention would have to be given to this factor in the design of the course to minimize the extent to which librarians and the library are seen as part of "the system" rather than as allies in the accomplishment of students' goals.

Nonetheless, it is difficult for librarians to gain students' trust if students and librarians never come into contact. As Hebert & Duet (2017) observe, success in coursework and personal contact with librarians are both drivers of increased information self-efficacy; a program that combines the two should leave students with better library skills and higher information literacy. It would also give librarians an ongoing opportunity to observe students' information needs and their perception of the library and of library services at first hand, as a complement to more systematic but less immediate methods of assessment such as patron surveys, thus placing librarians and the library in a better position to address shortfalls in engagement, inclusion, accessibility. Finally, it would bring librarians more into direct contact both with current instructional faculty and with graduate students who, even when not already performing that role, will nonetheless be the instructional and research faculty of tomorrow.

CONCLUSIONS & FUTURE DIRECTIONS

Graduate students are a diverse and complex population, but one that nonetheless presents a number of commonalities in their information behavior. They seek information from a variety of sources, including faculty, their peers, and the open Internet. They make some use of library resources, including the catalog and journal databases, but often use the library more for access than for search. They prefer electronic resources to print, when available, a preference that has only grown stronger over time. While many students consult faculty, many prefer to consult their peers, and even more so when those peers share a racial, cultural, linguistic, or national identity with the students that faculty lack. Few students consult librarians, and many lack awareness of potentially valuable library resources. Information barriers faced by graduate students include time pressure, which drives a preference for ease and speed of access over quality, and makes students deprioritize library instruction and improving their information skills; information overload, which causes students to minimize their information input and terminate searches prematurely; unawareness of available resources; overestimation of their own information skills; and library anxiety, information anxiety, and/or low information self-efficacy, all of which make it more difficult for libraries to reach students.

To overcome some of these barriers and provide librarians an opportunity to help students overcome others, I propose integrating library and information

literacy instruction into core graduate curricula, bringing students and librarians into contact, allowing librarians to help students improve their skills and allowing students to become more familiar with library resources and more comfortable with the library and with librarians. The idea of integrating library instruction into coursework is not new. Van Kampen-Breit (2017) suggest working with faculty to assign library liaisons to classes; Hawes & Mason Adamson (2016) report success with embedding a librarian in an online course in instructional design; one of the graduate student instructors interviewed by Sadler & Given (2007) notes the value of orientations given by librarians at the start of a class. This is an information behavior paper, not a library pedagogy paper; it seems likely that even if this exact approach has not yet been tried, many past and present programs have been that would provide useful building blocks for it—as well, perhaps, as valuable information on attempts at analogous approaches that have *not* been effective. A survey of the extensive volume of library program evaluation literature, only some of which is touched on here, would likely be instructive, although as Todd (2017) argues, what would be most useful would be to better establish research-based, research-validated foundations for information literacy instruction. Such research might also point toward extending a program of this type to undergraduate and perhaps even secondary or primary education.

Again, however, it is difficult to provide information literacy instruction within the library to students who never enter the library. If students—and faculty—are to fully appreciate what librarians have to offer, librarians may need to come to them.

> Then the librarians come—like vampires, some say, but others say like the fairy godparents at a christening. They speak to the child, and the child joins them. Henceforth he is in the library wherever he may be, and soon his parents know him no more.[9]
>
> —Gene Wolfe, *The Shadow of the Torturer*

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NOTES

[1] Wolfe (1980), p. 43.

[2] Following Catalano (2013), in the body of this paper "students" will refer to this population of graduate students, unless otherwise noted. Students of medicine and nursing are generally not considered—although there is substantial literature on their information behaviors, and a comparative survey could be informative.

[3] Note that the NCES figures include students of medicine and related fields. Regarding non-U.S. institutions, while I do not have worldwide figures, it is notable that more than two-thirds of the graduate students surveyed by Erfanmanesh et al. (2014) at a research university in Kuala Lumpur were non-Malaysian.

[4] EBSCO's documentation is unclear as to the effect of combining Boolean operators in keyword searches. (I am not at all surprised to note several papers complaining that graduate students don't know how to do proper Boolean searches; I'm not sure EBSCO does, either.) But from experimentation, the LISTA database at least appears to be following the usual order of Boolean operations, i.e. operating as if the query were specified (*information) AND (doctoral students OR post-graduates OR graduate students)*, which in this case would be the desired behavior. The initial search produced some 400 results, of which I was able to eliminate roughly 350 as false positives (e.g. studies focusing on populations other than graduate students) or as addressing graduate student information behavior only indirectly (e.g. in the course of system or program evaluations).

[5] A trend present even before the COVID-19 pandemic, though likely accelerated by it, with those enrolled exclusively in distance education courses making up 40% of U.S. postgraduates in 2021, vs. only 22% in 2012 (NCES 2014; 2023). The 2021 figure of 40% represents a drop from 2020's mid-pandemic high of 52%, but is still notably higher than the 2019 figure of 33%.

[6] Kavanagh & Barykina (2023), p. 4; p. 7. Unfortunately, Kavanagh & Barykina do not break down differences in responses between on-campus students and distance learners; it is also somewhat difficult to tell just how many of each they had, as they give the total number of responding students as 216, while giving the number of on-campus students as 170, and the number of distance learners as 145, for an apparent total of 315 (p. 4).

[7] Michalak et al. (2017) find significant discrepancies between students self-assessed skill levels and their demonstrated skills on an information literacy assessment, varying by age, gender, and subset of skills. In the light of the statistical critique of the "Dunning-Kruger Effect" made by Magnus and Peresetsky (2022), I am inclined to look at these findings somewhat skeptically, but I haven't taken the time to really examine the study design—which may be beyond my own statistical skills in any case.

[8] See e.g. Mellon (1986); Bostick (1992); Onwuegbuzie & Jiao (2000).

[9] Wolfe (1980), p. 47.