

Georgia State University

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2018

Data and Graduate Students: Less Naked and Less Afraid, or Giving Graduate Students the Clothes and Confidence for Data Success

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CHAPTER 23

DATA AND GRADUATE STUDENTS

Less Naked and Less Afraid, or Giving Graduate Students the Clothes and Confidence for Data Success

Mandy Swygart-Hobaugh

The basic premise of the reality television show *Naked and Afraid* is as follows: two people are released into the wilderness, with no clothing and minimal supplies, and are tasked with surviving for twenty-one days.¹ This premise is an apt analogy for the experience of greenhorn graduate students: dropped into an unfamiliar academic wilderness with little to no survival skills. In a fleeting two to five years, they are expected to emerge holding a graduate degree. This edited volume recognizes the particular vulnerability of graduate students and the need for targeted library services to build the skills and knowledge necessary for their survival in academia. In this chapter, I will focus attention on graduate students' *data* needs, presenting the following: (1) an overview of the services the Georgia State University Library's Research Data Services Team (including myself) provides to help social science graduate students with their data needs; and (2) an examination of one year's data services consultations with graduate

students that further elucidates their pressing data needs and how the Georgia State University Library is endeavoring to meet those needs. This close look at our experience of providing data services demonstrates the potential for academic librarians to push the boundaries of their traditional roles and become embedded in graduate researchers' processes throughout the research life cycle.

Data Services Needs of Graduate Students

While graduate students in the social sciences are likely to have undergraduate experience doing secondary research such as literature reviews, they often have minimal to no experience in collecting and analyzing data (be it quantitative or qualitative), a requisite for completing theses or dissertations.¹ They also are crunched for time and lack monetary resources, thus prohibiting ambitious collections of new data and often necessitating reliance on existing data sources for their own original analysis.² Also, graduate students holding research assistantships are often expected to perform data collection, management, and analysis tasks to support faculty research on top of their own.³ As a result, graduate students need targeted and expedited guidance in data discovery, collection, management, and analysis. Ideally, this need would be primarily filled by the disciplinary faculty. However, at many universities (including Georgia State University), faculty numbers are shrinking while graduate student numbers are rising. Thus, faculty are stretched thin in providing the comprehensive data-related support that graduate students need. Consequently, academic libraries are increasingly stepping up to support floundering graduate students (as well as other campus researchers) in these areas.⁴

* Kellam and Thompson offer a broad definition of what researchers and data services professionals supporting them generally envision as data: "Data ... are the product of taking that raw informational input and assembling it into a structured form for analysis. Data are a product of research as well as an input for research. Research data collections (or *datasets*) are generally in electronic form and are accompanied by or incorporate metadata, or documentation that describes the structure and content of the data" (Lynda M. Kellam and Kristi Thompson, eds., *Databrarianship* [Chicago: Association of College and Research Libraries, 2016], 3). From this definition, data can be numeric or quantitative as well as qualitative (e.g., "artifacts, cultural text and productions; observational, historical, interactional, and visual texts" [Norman K. Denzin and Yvonna S. Lincoln, eds., *The SAGE Handbook of Qualitative Research*, 3rd ed. (Thousand Oaks, CA: Sage, 2005), 3–4]).

Data Services across the Research Life Cycle

The Georgia State University Library has identified as a strategic intention the development of library services for all levels of campus researchers (undergraduate, graduate, staff, and faculty) across the entire research life cycle.⁵ Drawing from other academic libraries' conceptualizations of the research life cycle, the Georgia State University Library created its own rendition containing four phases: *exploring and questioning*, *designing and planning*, *analyzing and creating*, and *sharing and documenting* (see figure 23.1).⁶

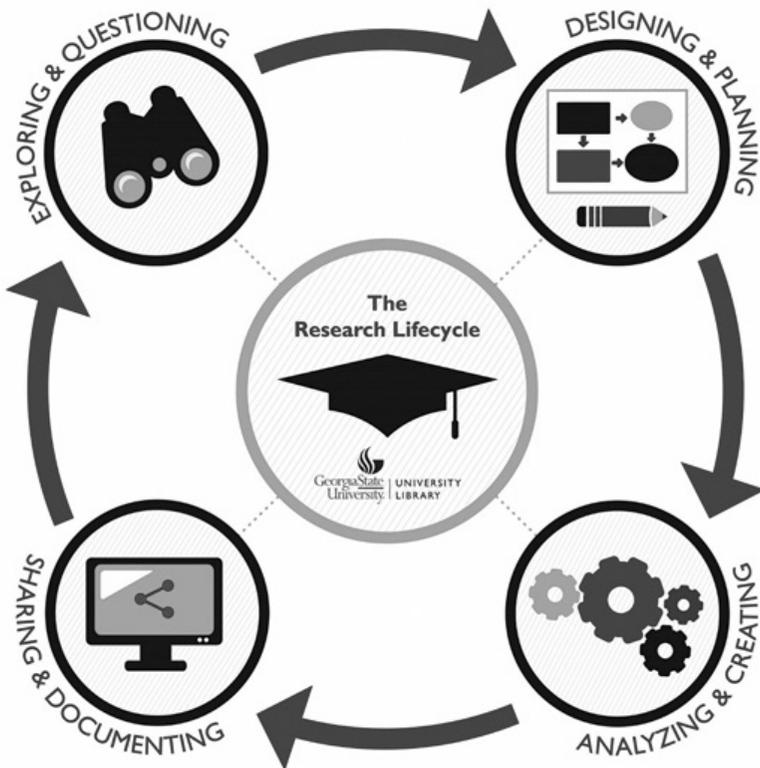


Figure 23.1

Georgia State University Library's research life cycle model.

Academic libraries are well known for supporting the exploring and questioning phase of the research life cycle (e.g., aiding undergraduates, graduate students, and faculty in finding secondary resources for research papers or literature reviews); subject liaison librarians routinely dedicate significant support to this phase. In terms of research data services, many academic libraries (Georgia State University Library included) have made recent forays into supporting researchers in the sharing and documenting phase, particularly in helping faculty write and fulfill data management plans for their grant funding proposals that enable sharing of their data for replication and reuse purposes.⁷ However, like Rutgers University Libraries, the Georgia State University Library recognized an increasing need on campus for support during the “middle part of the research process, after researchers have gathered the data and before publication of their results.”⁸ In our model of the research life cycle, these middle phases involve researchers designing and planning their original research project (e.g., finding existing or collecting original data, exploring and learning appropriate data analysis tools) and analyzing and creating their data and research outputs (e.g., cleaning up messy data, performing data analysis, creating data visualizations). There has been a gap in support in these phases at Georgia State University, and the University Library developed our articulated research data services and our dedicated Research Data Services Team in July 2016 to fill this gap. Moreover, our strategic intentions to cultivate data fluency among all students and to “develop a cutting-edge approach to academic library support of graduate students” intersect in our research data services targeted at and heavily used by graduate students.⁹

Data Services at Georgia State University

The Georgia State University Library’s Research Data Services (RDS) Team supports research and learning across multiple social sciences disciplines involving quantitative, qualitative, business, and spatial/GIS data. The RDS Team is currently comprised of three dedicated librarians (including myself) plus three affiliate librarians volunteering their time to offer specific services. Table 23.1 outlines our five primary areas of data services support and the suite of services we offer in these areas.

Table 23.1

Data Services, Areas of Support, and Services Offered

<p>Finding Data</p> <ul style="list-style-type: none"> • US Census data • Social science data (ICPSR, qualitative data, & more) • Business data, consumer & marketing data, & international trade data • Bloomberg Terminal for real-time financial market data 	<p>Survey Design</p> <ul style="list-style-type: none"> • Qualtrics survey tool • Finding existing surveys & measurement scales for data collection
<p>Data Analysis Tools</p> <p><i>Quantitative</i></p> <ul style="list-style-type: none"> • Excel • R • SPSS • SAS <p><i>Qualitative</i></p> <ul style="list-style-type: none"> • NVivo • Voyant for text analysis • Topic modeling & text mining 	<p>Mapping & Data Visualization</p> <ul style="list-style-type: none"> • ArcGIS & ArcGIS Online • Social Explorer & SimplyAnalytics • Geocoding services • Esri Story Maps • PolicyMap • Business Analyst & Community Analyst • Tableau data visualization • Data visualization assistance
<p>Data Management</p> <ul style="list-style-type: none"> • Assistance with writing data management plans for research funding grant proposals & managing data throughout the research life cycle 	

The RDS Team's website—<http://research.library.gsu.edu/dataservices>—lists these areas of support (accompanied by initials icons indicating the librarians to contact for specific services) and links to a calendar of our drop-in consultation hours and workshop offerings.¹⁰ We also have several tailored RDS guides linked from our primary website:

- guides for finding existing data sources, including guides for the following: (1) finding existing social science quantitative and qualitative data; (2) assistance with identifying data sets in the Inter-University Consortium for Political and Social Research (ICPSR) database; (3) finding international trade and consumer and marketing data; and (4) assistance with using Bloomberg Terminals for real-time financial market data;¹¹

- guides for SPSS statistical and NVivo qualitative research software;¹²
- guides for data visualization tools and resources generally and GIS tools and resources specifically;¹³
- a guide including resources for Qualtrics survey tool assistance, links to specific institutional review board (IRB) webpages for human-subjects research assistance, and tools for identifying existing surveys and measurement scales;¹⁴ and
- a guide for data management, including resources for the following: (1) writing data management plans; (2) organizing data, including resources for creating metadata, file-naming conventions, and data cleaning; (3) using the Open Science Framework (OSF) and Dropbox for Business tools for sharing data with research collaborators during the active or working-data phase; and (4) sharing data in the post-publication phase, including file format suggestions for long-term access and preservation and suggested data repositories for sharing data for reuse by other researchers.¹⁵

The RDS Team offers open workshops for all Georgia State University constituents. Table 23.2 lists the open workshops given since the RDS Team's inception in July 2016, mapped to the corresponding RDS areas of support.

We held a total of seventy-one open workshops from July 2016 to November 2017, with 461 people attending. The workshops focused on software and tools training (e.g., SPSS, Tableau, NVivo) generally were more heavily attended, and the average attendance overall was six attendees per workshop. We did not collect official data about attendee status, but, drawing from information informally gathered by workshop leaders, it is fair to say that the majority of attendees were graduate students. Workshop leaders distribute a link to a brief workshop evaluation form for attendees to complete.¹⁶ In all, 122 attendees completed evaluations, 68 (56%) of which were graduate students. Of the 68 graduate students, 47 (69%) rated the workshops as “very good,” 20 (29%) as “good,” one (2%) as “fair,” and none as “poor.” When asked, “Was there something you had hoped to learn that you didn’t?” and “Do you have any other feedback to offer us for improving this workshop?” recurring themes from the graduate students included wanting (1) more in-depth coverage of data analysis procedures and software and tool features and (2) more time to answer questions about their specific data needs.

Table 23.2

Data Services Workshops Offered from July 2016 to Present

<p>Finding Data</p> <ul style="list-style-type: none"> • Finding International Economics and Business Data • Market Analysis Resources for Small Businesses and Entrepreneurs • Finding Datasets with ICPSR 	<p>Survey Design</p> <ul style="list-style-type: none"> • Qualtrics Essentials: Getting Started • Qualtrics Surveys: Branch and Flow
<p>Data Analysis Tools</p> <p>Quantitative Data</p> <ul style="list-style-type: none"> • SPSS Series (SPSS 1: Getting Started; SPSS 2: Analyzing Data) • SAS Series (SAS 1: Introduction to SAS Statistical Software; SAS 2: Data Manipulation; SAS 3: Data Analysis and Visualization) • Manipulating Data and Analytics using SAS Studio^a • Stata Statistical Analysis Software: Getting Started • Statistics in the Real World [Excel] <p>Qualitative Data</p> <ul style="list-style-type: none"> • NVivo Series (NVivo 1: Getting Started; NVivo 2: Exploring your Data) • The Logics and Logistics of Qualitative Research • Text Analysis: Mind vs. Machine [NVivo and Voyant] 	<p>Mapping & Data Visualization</p> <ul style="list-style-type: none"> • Tools for Exploring and Visualizing US Demographic Change • Creating Web Maps Using ArcGIS Online and Esri's Story Maps • Geocoding Small or Very Large Sets of Addresses • Tableau Data Visualization: Getting Started
<p>Data Management</p> <ul style="list-style-type: none"> • OpenRefine for Cleaning and Organizing Data 	
<p>a. This all-day workshop was provided by SAS® company trainers.</p>	

The RDS Team also offers custom sessions for credit-bearing courses and for research teams, the latter often involving graduate students attending in their capacity as research assistants supporting faculty research projects. From July 2016 to November 2017, we offered thirty-two custom sessions with 570 total people attending, an average of 18 attendees per custom session. Below are examples of custom sessions given specifically to graduate students:

- NVivo sessions in graduate-level qualitative methods classes for the departments of African American Studies, Anthropology, Applied

- Linguistics and English as a Second Language (ESL), Communications, Political Science, and Sociology;
- SPSS session with School of Nursing doctoral students;
 - session for the Sociology department’s master’s-level multivariate data analysis class on finding existing quantitative data sets for an empirical analysis project;
 - session on using OpenRefine for data cleaning and formatting for a College of Business class on business intelligence;
 - sessions on using Social Explorer for generating maps and reports to explore demographic data for a master’s-level School of Social Work class;
 - Tableau data visualization software session for School of Education graduate students; and
 - NVivo group sessions and one-on-one consultations with graduate research assistants supporting faculty research projects in the School of Nursing, the School of Public Health, the Global Studies Institute, and the Gerontology Institute.

The RDS Team offers drop-in consultations at a public service point in our Collaborative University Research and Visualization Environment (CURVE) space, and we are also available for scheduled consultations. We use Springshare’s LibInsights to log our consultations, via which we record information about patron type (undergraduate, graduate, etc.), academic department of the patron, consultation format (in person, email, phone, etc.), level of effort required for the consultation, amount of time spent on the consultation, and free-text entry of notes about the consultation topic. For the RDS Team’s inaugural year (July 1, 2016, to June 30, 2017), we logged a total of 328 data services consultations, 190 (58%) of which were with graduate students (see figure 23.2).

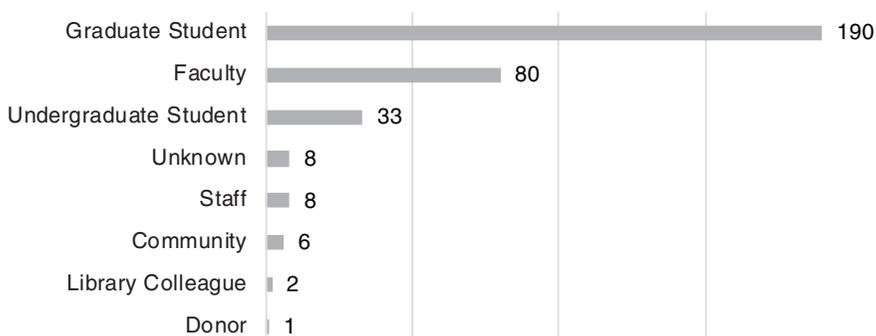


Figure 23.2

Data services consultations by patron type.

Data Services at Georgia State University for Graduate Students—A Closer Look

As figure 23.2 confirms, graduate students were the RDS Team's most-served patron population in terms of data services consultations during our inaugural year. In this section I will discuss key findings from my close examination of these consultations. Analysis methods:

- I exported the consultation data from Springshare's LibInsights into Excel to generate summary statistics and data visualizations.
- I imported the consultation data into NVivo qualitative research software to analyze the free-text entries logged in the consultation topic notes field, using the areas of data support services described in table 23.1 to inform categorical themes for manually coding/tagging consultations. I also used NVivo queries to further examine the notes field content and to explore relationships between my coded themes and the logged information, exporting query results to Excel to generate data visualizations.

As illustrated in figure 23.3, 108 (57%) of the 190 graduate student data services consultations were conducted in person, 77 (40%) were conducted via email, and a negligible 5 (3%) via phone.

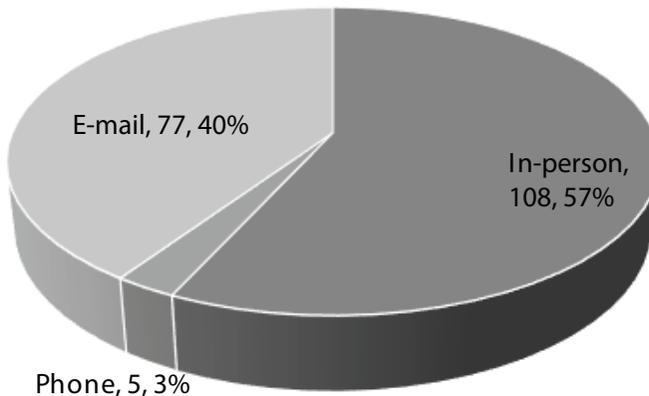


Figure 23.3

Graduate student data services consultations by question format.

As indicated in figure 23.4, the RDS Team expended significant effort during our graduate student data services consultations, with a combined 152

(80%) recorded as requiring “3. Effort” (82, 43%) and “4. Significant effort” (70, 37%) to conduct.*

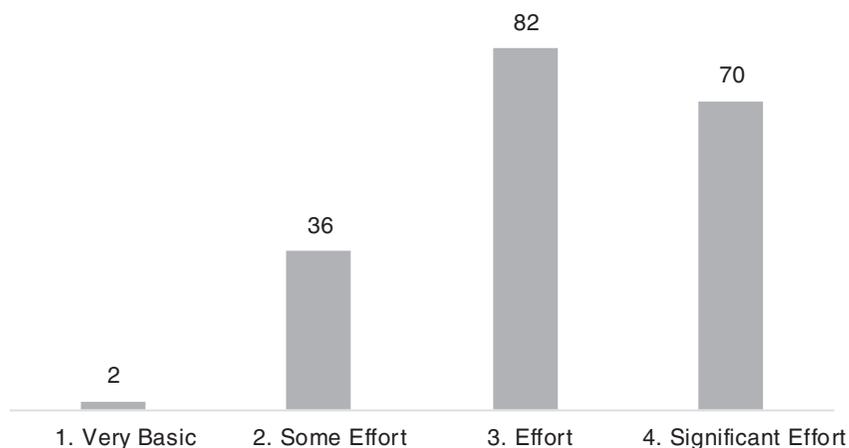


Figure 23.4

Graduate student data services consultations by effort required.

Figure 23.5 depicts time spent on consultations: 89 (47%) of our consultations took thirty minutes or less to conduct, with 56 (29%) taking up to sixty minutes and 45 (24%) taking more than sixty minutes. And I can personally attest that for consultations on analysis software such as NVivo or SPSS, it is not unusual for those “60+ minutes” consultations to last upwards of 120 minutes.

Figure 23.6 breaks down effort required for consultations by format (email, in person, phone). A combined 97 (90%) in-person consultations were recorded as requiring “3. Effort” and “4. Significant effort” to conduct, which may come as no surprise. However, a combined 52 (68%) email consultations recorded as requiring “3. Effort” and “4. Significant effort” is an interesting finding as it indicates that data services consultations via email can require deep levels of knowledge and detailed instruction—that is, an email consultation does not by default equate to less effort.

* Georgia State University Library’s four-point effort scale is an adaptation of the six-point READ Scale widely used by libraries to rank effort expended on reference transactions. See Bella Karr Gerlich, “Welcome to the READ Scale Research Web Site,” accessed November 20, 2017, <http://readscale.org/index.html>, and Christopher Ross Bowron and Joseph E. Weber, “Implementing the READ Scale at the Austin Peay State University Library,” *Journal of Academic Librarianship* 43, no. 6 (2017): 518–25.

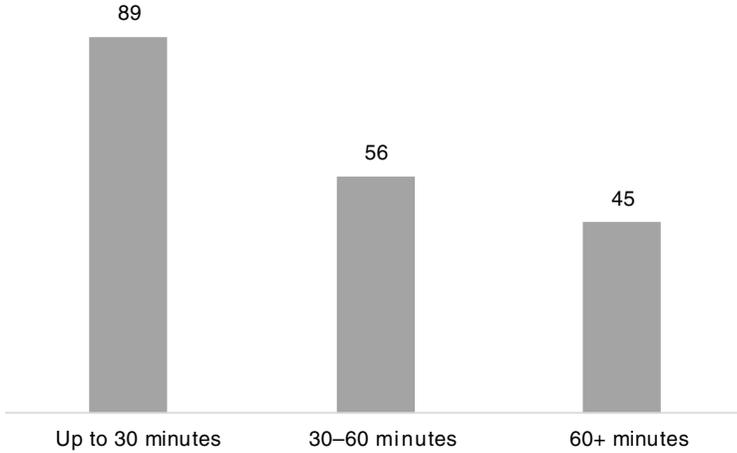


Figure 23.5
Graduate student data services consultations by time spent.

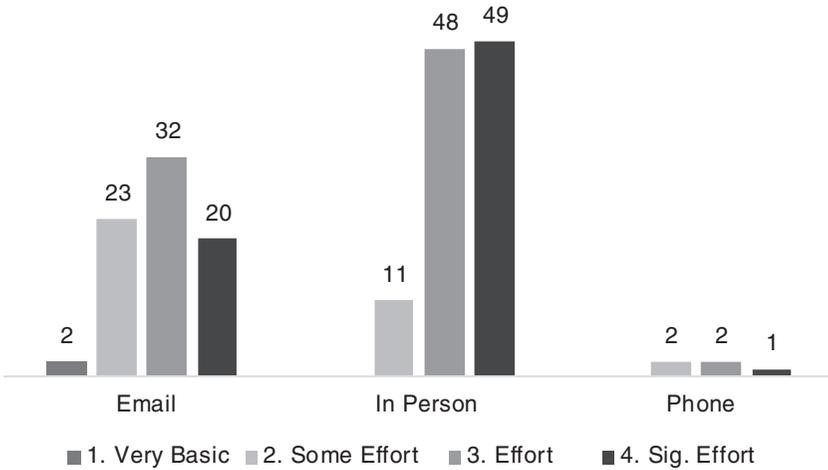


Figure 23.6
Graduate student data services consultations, effort required by question format.

The RDS Team records brief descriptions of the topic of the consultations in the notes field of the logged data services consultations. Using NVivo’s word frequency query feature, I generated a list of the top twenty substantive words that appeared in the notes field of the graduate student consultations (see figure

23.7).^{*} While it is not surprising that *data* occurred most frequently, that *NVivo* and *SPSS* were second and third in the ranking is revealing: it alludes to the predominance of graduate student consultations that involved data analysis software support. Frequently appearing words such as *files*, *analysis*, *variables*, *download*, and *merge*, when looked at in context, also reveal that software support pervaded our consultations with graduate students. That *find* appears fourth in the ranking suggested that assisting graduate students with finding existing statistics and data sources was also common.



Word	Count
data	112
nvivo	49
spss	46
find	42
files	30
analysis	21
dataset	20
research	19
variables	18
survey	17
geocoding	17
access	17
excel	15
download	15
source	15
search	15
gra	13
hours	13
terminal	13
merge	12

Figure 23.7

Graduate student data services consultations, top twenty words from topic notes.

To approach manually coding/tagging the consultations for data support services categories and subcategories, I first read the topic notes field, initially coding the content to the five general areas of support discussed earlier (see table 23.1). I then collapsed these categories into two broader categories—*Find and Access Data* and *Analyze and Visualize Data*—and maintained appropriate subcategories within them as warranted (see table 23.3).

^{*} NVivo automatically excludes common stop words from the word frequency analysis (*and*, *the*, *a*, etc.). I ran approximately five iterations of the query to arrive at the final results reported in figure 23.7, using the stemmed word groupings feature (e.g., “find” count includes *find*, *finding*, *finds*) and adding words to the stop words list that had no substantive meaning within the context of the consultation topic.

Table 23.3

Graduate Student Data Services Consultations, Coded by Service Category

Category	Number Of Consultations	Category	Number Of Consultations
Find & Access Data (FD)	63	Analyze & Visualize Data (AD)	131
FD – GIS	4	AD – Analysis Help	8
FD – Qualitative	4	AD – Software	123
FD – Statistics	8	<i>AD – OpenRefine</i>	1
FD – Census Data	10	<i>AD – Tableau</i>	1
FD – Quant. Data Sets	15	<i>AD – Data Viz Tools</i>	3
FD – Business	22	<i>AD – SAS</i>	4
		<i>AD – Excel</i>	7
		<i>AD – Qualtrics</i>	11
		<i>AD – GIS</i>	19
		<i>AD – SPSS</i>	34
		<i>AD – NVivo</i>	43
Note: The total number of consultations reported above (194) exceeds the actual count (190) due to some consultations being coded to multiple categories (e.g., a single consultation might involve both finding data and analyzing data).			

The current literature notes that data services librarians commonly assist researchers in finding existing statistics and raw data sources for analysis and visualization purposes.¹⁷ The RDS Team’s logged consultations confirm that we have played that role for graduate students, with 63 (33%) of our total consultations falling into the category of *Find and Access Data*. Within this category, helping graduate researchers find business, market, or financial data occurred the most frequently, with finding quantitative data sets and US Census data following close behind. While the majority of consultations within this category were students seeking existing data for their own research, a handful were graduate research assistants tasked with finding data for faculty research projects.

While about one-third of our graduate student data services consultations fell into the more traditional role of assisting in data discovery (*Find and Access Data* category), a noteworthy amount fit the category of *Analyze and Visualize Data*: 131 (69%) of the total 190. This category was almost exclusively comprised of software/tool assistance consultations: 123 (94%) of the total 131 in this category. And, as was hinted by the word frequency query results, consul-

tations on using NVivo qualitative software, 43 (35%) of the software subcategory, and SPSS quantitative software, 34 (28%) of the software subcategory, predominated the Analyze and Visualize Data subcategory.

I am the sole librarian giving NVivo consultations, and I also gave many of the SPSS consultations. As such, I can speak to the breadth of topics such consultations can span: managing, organizing, and preparing both quantitative and qualitative data sources for analysis; capitalizing on the software features to perform analyses; advising on proper statistical tests to run; interpreting results of analyses; and visualizing the data for analysis and presentation purposes. Similarly, the remaining eight consultations in the Analysis Help subcategory of the Analyze and Visualize Data category involved questions about running particular statistical procedures or requests for resources to learn more about how to perform data analysis. Given the gamut of knowledge and skills summoned in the consultations falling in the Analyze and Visualize Data category, it is not surprising that consultations in this category generally took more time to conduct than those in the Find and Access Data category (see figure 23.8).

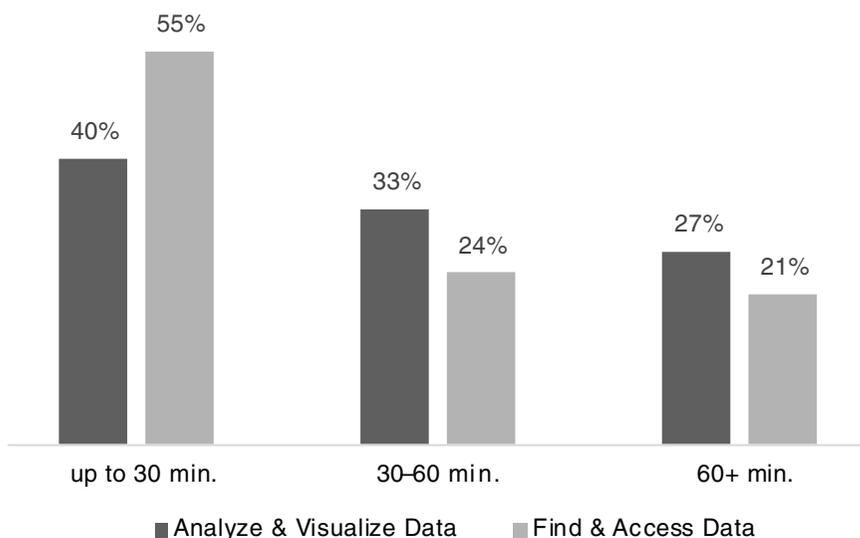


Figure 23.8

Graduate student data services consults, service category by time spent.

Traditionally it is relatively uncommon for academic libraries to offer statistical consulting and analysis software and data computing services, so our

making forays into this area is somewhat unprecedented. However, other data librarians have begun to advocate for expanding librarians' roles in this direction—particularly when no other campus entity is meeting the demand, as is the case at Georgia State University—so we are not alone in pushing our boundaries and going, as a Rutgers Libraries data librarian describes it, “one step deeper in the research process.”¹⁸ Moreover, and as Rutgers Libraries data librarians also experienced, graduate students at Georgia State University are definitely “enthusiastic data computing services consumers,” gauging from the amount of analysis software consultations and from their attendance at workshops and custom sessions focused in this area.¹⁹ We have learned that, at minimum a basic awareness, and, ideally, an advanced awareness of quantitative and qualitative analysis methods and procedures is necessary to expand library data services into analysis software support.

I have a strong background in qualitative research and, consequently, feel confident in advising on methods and procedures for analysis of qualitative data. In addition, I feel comfortable with providing basic-level advice on statistical analysis. Responding to the perceived need for advanced-level quantitative analysis support, the Georgia State University Library in June 2017 hired a Quantitative Data Specialist for the Social Sciences for a newly created position to enhance our capacity to assist campus researchers with data analysis software and to expand our ability to provide statistical consulting.

Data and Graduate Students: Making Them Less Naked and Less Afraid

As revealed by my close examination of the workshop, custom session, and consultations data we have collected, our graduate students are hungry for guidance in data discovery, collection, management, and analysis. I assert that the graduate experience at Georgia State University is not unique, and the existing research literature on data services targeted at graduate students supports this claim.²⁰ We at the Georgia State University Library have found a fruitful niche supporting this specific student population that can serve as a model for other libraries considering expanding support in the area of data services. As noted by Carlson and colleagues:

[A] fully functional, richly stocked DIL [data information literacy] program may not be entirely under the domain of librarians. However, if librarians have the skills required to teach database management and data analysis, for example, there is

no reason why they should not teach those concepts. Indeed, learning those skills can help librarians remain integral to the educational mission of the university.²¹

With faculty increasingly challenged to provide the comprehensive data support that graduate students need, it comes as no surprise that these students are turning elsewhere for additional help. Likewise, in consultations with graduate students I have gauged that many are hesitant to admit any ignorance to their faculty, with the fear of looking inept looming over them and thus hindering their academic growth. But, with academic libraries increasingly forging into this wilderness of data services support and focusing our efforts on this vulnerable student population, we are helping them gain the survival skills to feel less naked and less afraid so they may emerge from that wilderness clothed and confident in their data-related abilities.

Notes

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