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Library Support in Times of Crisis: An Analysis of Chat Transcripts during COVID

This paper presents the analysis of over 4,000 chat questions from 2019-2020. Each chat question was individually categorized into broad level topics, and analyzed using sentiment analysis. During the COVID Pandemic, there was an increase in the number of questions about accessing the physical collection, and a large decrease in questions about using the library space. The overall sentiments of the chat questions were much more negative during COVID. Tagging and analyzing chat questions in this way can offer unique insights for all types of libraries to appropriately staff the service and best support patron needs in times of crisis.

Keywords: chat analysis, COVID, virtual reference, sentiment analysis

Introduction

Georgia State University (GSU) is a large research institution based in Atlanta, Georgia. The main campus is in downtown Atlanta. In 2016, it consolidated with Georgia Perimeter College and now has Perimeter College campuses located in Alpharetta, Clarkston, Decatur, Dunwoody, and Newton. GSU Library has used Springshare's LibChat to provide virtual reference since 2014.

COVID forced libraries to increase their online presence and assistance to patrons online when campuses began shutting down in March 2020. GSU campuses were completely closed from March until August 2020. Although the University partially reopened in fall 2020, most classes were offered online, or students attended class 25% of the time in-person. As a result, most public service points in-person at the library remained closed or limited, and there was still a large emphasis on online-only support, including increased chat staffing and hours offered.

Currently, chat transactions at GSU Library only capture the patron's status with the University (faculty, staff, or student), and whether they are Atlanta or Perimeter students. At

the conclusion of the chat, patrons have an option to comment on the transaction and rate the chat on a five-point scale, but no other information about each transaction is recorded. This study seeks to identify what the topics of the chat questions were, particularly during 2019 and 2020 to identify what patrons used the chat service for and how the topics of chats were different during COVID.

Literature Review

Description of chat analysis and research

Virtual reference is defined by the American Library Association (ALA) Reference and User Services Association (RUSA) (2017) as a “service initiated electronically for which patrons employ technology to communicate with public services staff without being physically present. Communication channels used frequently in virtual reference include chat, videoconferencing, Voice-over-IP, co-browsing, e-mail, instant messaging, and text” (Definition of Virtual Reference section, para 1). Chat reference, although one form of communication that falls under the overall umbrella term of virtual reference, is often used in the literature synonymously with virtual reference.

Chat transactions have been analyzed in the literature for a variety of reasons, as they offer high quality data and relevant insight for library operations. Chat analysis studies have looked at which populations were specifically using virtual reference service (Houlson et al., 2007; Nolen et al., 2012; Skaggs, 2020), insights and opportunities for better customer service and patron satisfaction (Fuller & Dryden, 2015; Logan et al., 2019; Maness, 2008; Mavodza, 2019; McKewan & Richmond, 2017), and opportunities for library staffing and training (Armann-Keown et al., 2015; Fuller & Dryden, 2015; MacDonald, 2020; Meert-Williston & Sandieson, 2019; Morais & Sampson, 2010; Mungin, 2017). Studies have also used chat data to improve various areas of the library, such as addressing noise complaints in

the physical spaces (Vance, 2018), technical services (Kimbrough, 2018), electronic resources (Bourgeois & Bealer, 2020) or website redesign (Fan & Welch, 2016; Powers et al., 2011).

There is emerging research on novel approaches to qualitative data analysis on data sources such as tweets and chat transcripts in libraries. Ozeran & Martin (2019) applied topic modeling to chat transcripts to identify the most common chat topics during a semester. Lund (2020) executed sentiment analysis of library tweets. This study seeks to expand on such research, applying how sentiment analysis can be applied to qualitative data such as chat questions during COVID.

Research on library services during COVID

There is emerging research on how libraries adapted to virtual services (Breeding, 2020; Decker, 2021; Howes et al., 2021) or how core library services such as research consultations differed during the COVID pandemic (Anderson et al., 2021). A few articles have discussed the vital importance of virtual reference services during COVID (Dar, 2020; Radford et al., 2021).

Based on a College and Research Libraries News article by Radford et al., (2021), COVID brought an increased demand for virtual reference services in academic libraries, particularly for those seeking human connection and general university help. This study seeks to explore that issue a bit deeper and analyze what types of help patrons needed from the library chat service during this period. Radford et al., (2021) spoke of chat in more general terms, but no study has analyzed the content of chat questions and how they may have differed during COVID.

Methods

Chat Tagging

Although there are numerous studies with existing chat tags which could have been used to code the data in this study, the author did not want to be limited by using an existing set of tags. Instead, the author sought the flexibility of adding new types of questions and tags that may have been asked during such an unprecedented time as COVID. Therefore, a unique tag categorization was created based on the dataset for this study.

All chat transcripts that occurred from January 1, 2019 to December 31, 2020 were downloaded from Springshare's LibChat--a dataset of 4,271 chats. The questions were isolated from the full transcript (with no other identifying information of the patron or librarian), and then the dates of the chat questions were randomized to avoid bias while coding. The first 500 chats were open coded using grounded theory analysis with about 2-3 open topic tags for each chat question; an example of the open coding process is below in Table 1. According to Givens (2008), grounded theory coding refers to:

The steps the researcher takes to identify, arrange, and systematize the ideas, concepts, and categories uncovered in the data. Coding consists of identifying potentially interesting events, features, phrases, behaviors, or stages of a process and distinguishing them with labels. These are then further differentiated or integrated so that they may be reworked into a smaller number of categories, relationships, and patterns so as to tell a story or communicate conclusions drawn from the data. (p. 86)

Table 1. Open coding example

tag	tag	tag	Final tag
book search	textbook	known book	known title search
reference question	topic search	reference lookup	topic search

fine	late fee	circulation help	finest / fees / library account
book search	find book on shelf	building help	known title search
library access	library hours	library open	library hours
library building	lockers	building features	library building / department
citation help	software help	zotero	citation help
book mail	circulation help	book access	physical collection access / return
library hours	library availability	building hours	library hours
database access	reference question	research question	database access
book search	topic search	reference question	topic search

In the open coding process, the author coded for any two to three aspects of the question, as noted in Table 1. After further analysis, the questions that received similar tags were grouped into broader level categories. For example, questions about the specific title of a book or article were eventually consolidated into “known title search.” After that process concluded, the open tags were consolidated into 19 main categories, and the remainder of the chats were tagged with this new consolidated categorization. Each chat question in the full dataset was then assigned 1 broad level tag, with a representative list of definitions and examples found below in Table 2.

Table 2. Representative list of chat tags, definitions, and examples from dataset

Tags	Definition	Example from Dataset
known title search	mention title of book, article, thesis, dissertation or film in question, or how to access specific title through ILL or intercampus loan	"I am trying to find this article Mary Catherine Bateson: Composing a Further Life: The Age of Active Wisdom"

topic search	mention needing to find resources on a certain area of interest, includes questions like "do you have books on"	"Hi. I'm looking for articles where Critical Race Theory is used as a literary analysis theory, but I don't think I'm focusing my search correctly...can you help?"
website troubleshooting	indicate they are using an online resource but having issues with some aspect, accessing, or downloading article; include error message questions about ILLiad, catalog, databases	"I am trying to do some research for a research paper, but every time I click on "Login for full access" it shows "unexpected error occurred [Authentication Error Code 137] and it won't let me log in."
course support	includes textbook questions, iCollege, video streaming, reserves questions	"Does the library carry reserve copies of textbooks for graduate classes?"
technology / software support	indicate specific software program (not database) or hardware they need assistance with. Examples include Adobe, Endnote, Zotero, SPSS. Includes questions about laptop and technology lending services	"does the library have any sd adaptors?"
finest / fees / library account	indicate they have an overdue or lost item or are blocked, includes questions on how to clear account in order to graduate or check out more books	"I apparently have a fine that I need cleared in order to request an official transcript. I graduated 4 years ago. Please let me know what this is so that I can remediate ASAP"

visitor / alumni support / access	mentioned explicitly in question that they or someone they know are not affiliated with GSU but want access to library building or resources	"I am a current member of the GSU Alumni Association, do I have access to the library downtown and if so what steps do I need to take, as a result of the pandemic to gain access?"
citation help	mention explicitly citation or citation style in question	"Help with citing a movie poster in MLA"
noise complaint	complaint about loud patrons within building	"I am on the 4th floor of the library and there is a large group in the corner being very loud and disruptive. Also not wearing mask."
university help	includes questions about non library specific departments and resources: ID card, passwords, email, logging into non library resources, writing center	"How do I contact the writing lab?"
physical collection access / return	questions about book pickup, checkout, and return (including curbside and express pickup)	"Since the library is closed to students, how do you return materials? I have things out that are due the 30 th "

Sentiment Analysis

In a separate process, a sentiment analysis was conducted in R to assess the overall positive or negative rating of chats in the two time periods. Sentiment analysis can be defined as the ability to “extract subjective information from texts in natural language, such as opinions and

sentiments, so as to create structured and actionable knowledge” (Pozzi et al., 2016, p. 1).

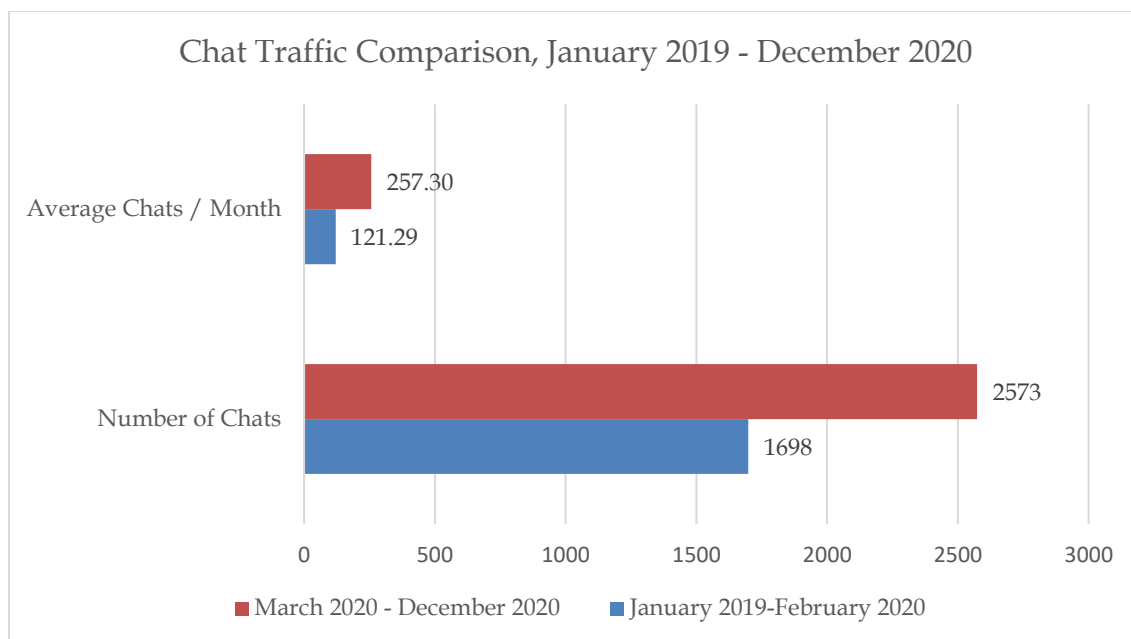
Lund (2020) describes it as:

Imagine taking a dictionary and sorting all the terms based on what type of sentiment they convey. Words like “happy,” “well,” and “delightful,” might be sorted into the category of “positive terms,” while words like “angry,” “poor,” and “disappointed,” might be sorted into the category of “negative terms.” There might be categories for emotions like “surprise,” “fear,” “sadness,” etc. Once these categories of terms are developed, it would be possible for a researcher to read a sentence such as “I am very happy with my experience at the library today,” as a positive statement, given the use of terms within the positive terms category and absence of any words in the negative terms category. These are the same principles utilized by an analytical software like R when performing sentiment analysis. (p. 114)

Sentiment analysis allows a unique and emerging form of analysis for chat transcripts in libraries. For this study, the words of the patron’s chat questions were grouped into positive or negative sentiments in a coding system developed by the Liu et al., 2005 model of sentiments. For this dataset, words like “good,” “quiet,” “gain,” were coded as positive, and words like “lost,” “error,” “unable,” were coded as negative. Common words called “stop words” were removed prior to coding. Stop words include pronouns and articles such as “me,” “you,” and “the” are typically not useful for analysis.

Findings

Table 3. Chat traffic comparison for pre-COVID and during COVID time period



There are two points of comparison in this paper. January 2019 until February 2020 defines the pre COVID period, while the March-December 2020 period is the COVID time period. The total number of chats from January 2019-March 2020 was 1698 chats. The number of chats from March – December 2020 was 2573 chats. The average number of chats per month more than doubled during the COVID time period, 121 to 257 chats per month. Although the March – December period was a shorter time period, this difference could be accounted for by the fact that the in-person service points of a library were either not available or less available during this time.

Chat Tagging Findings

Tables 4 and 5 below both outline the highest to lowest occurrence of chat topic tags during both the Pre-COVID and during COVID. Table 6 then breaks down how each topic changed in frequency during each time period.

Table 4. Breakdown of chat tag topics during pre-COVID time period

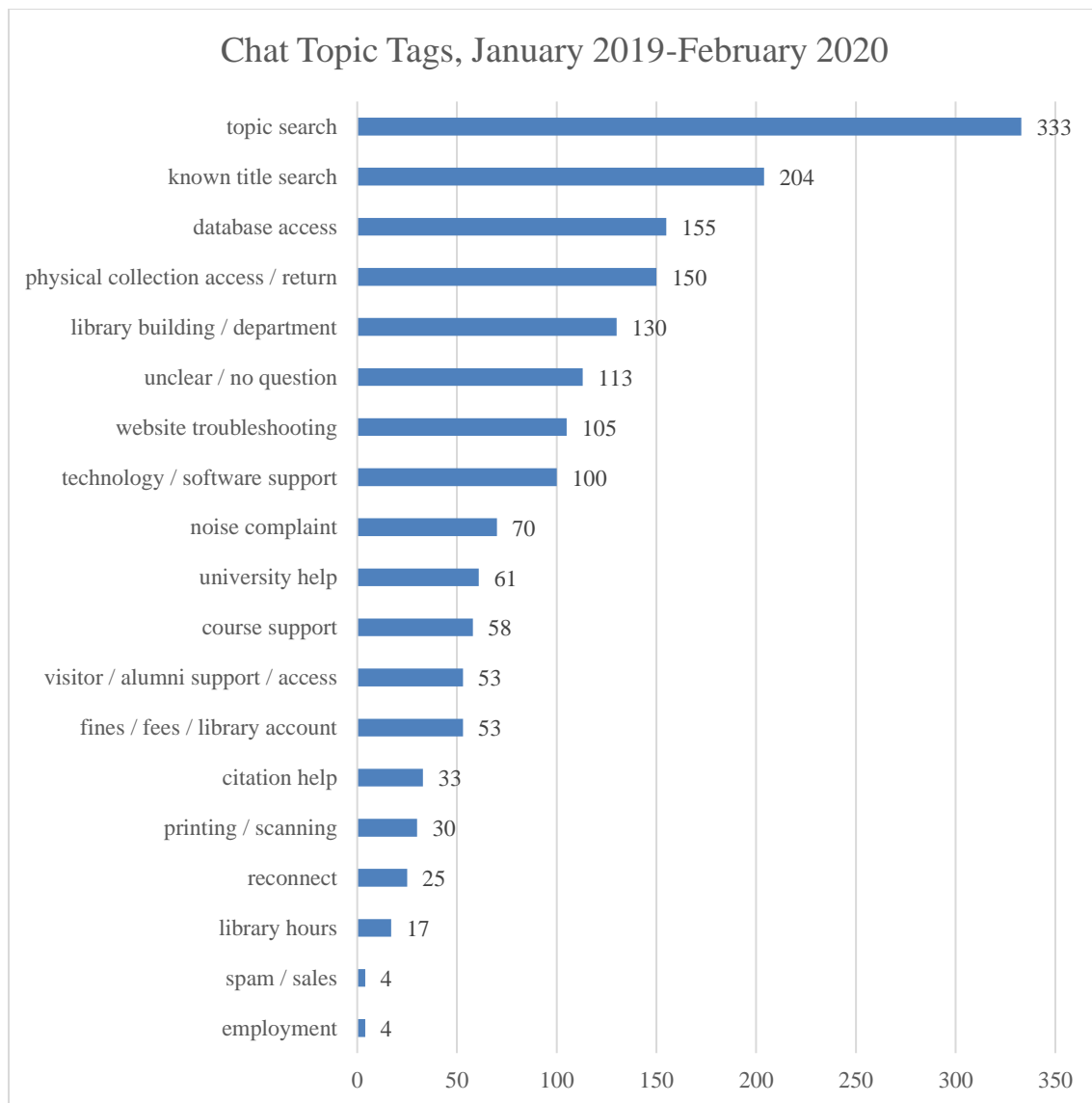


Table 5. Breakdown of chat tag topics during COVID time period

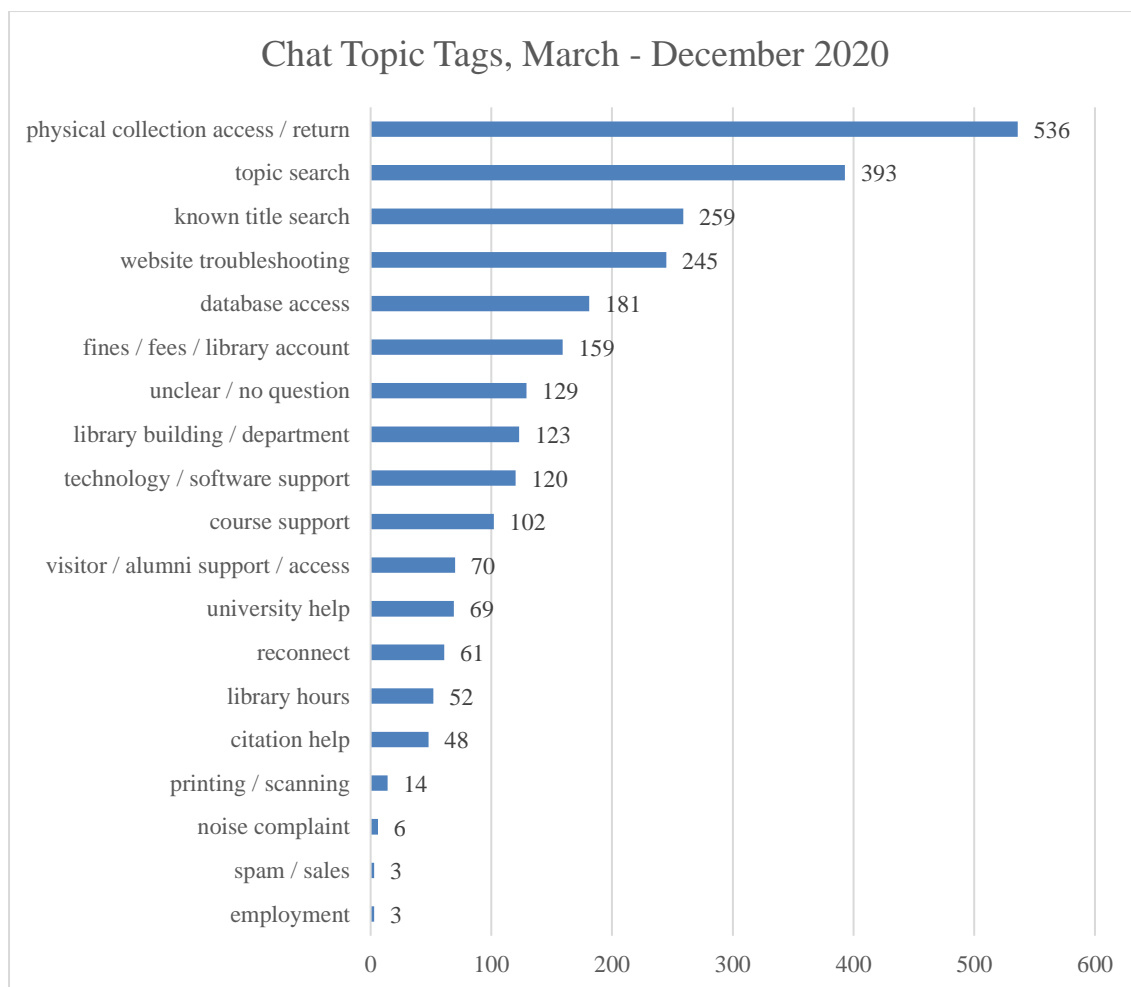


Table 6. Comparison of chat tag topics pre and during COVID

Chat Topic	Pre-COVID	During COVID	% Change
noise complaint	70	6	-91%
printing / scanning	30	14	-53%
employment	4	3	-25%
spam / sales	4	3	-25%
library building / department	130	123	-5%
university help	61	69	13%
unclear / no question	113	129	14%
database access	155	181	17%

topic search	333	393	18%
technology / software support	100	120	20%
known title search	204	259	27%
visitor / alumni support / access	53	70	32%
citation help	33	48	45%
course support	58	102	76%
website troubleshooting	105	245	133%
reconnect	25	61	144%
library hours	17	52	206%
finest / fees / library account	53	159	200%
physical collection access / return	150	536	257%
Total	1698	2573	

As shown in Table 6, questions about accessing and returning the physical collection grew the most during COVID. There was a higher percentage of questions on how to access physical books through visiting the library or picking them up through the new curbside service. Because the library was closed during some of the months of analysis, there was also an increased number of questions that dealt with how to return books in-person or through the mail.

In a similar vein, questions about fines and fees increased greatly presumably because patrons were unsure of being unable to return books and the effect it would have on their library account. Also, questions about library hours, reconnections, and website troubleshooting increased. This can be explained by the increase in online communication during COVID, with various forms of internet connections as people worked and managed daily duties increasingly from home and potentially unstable internet connections.

There was also an increase in questions related to course support and university help, though not as large an increase as predicted based on the discussion in the Radford et al. (2021) study. However, it is clear the library was a virtual space for students and GSU audiences to ask for assistance in a variety of ways outside of specific library services. The biggest decrease in topics occurred with chats dealing with the physical spaces and services of the library, such as noise complaints, as well as questions about printing and scanning. This is unsurprising since the physical library building was closed for about 5 months of the analysis period (mid-March to mid-August), and campus traffic was very low even after reopening due to the implementation of campus dedensification and social distancing.

Sentiment Analysis Findings

The 25 most frequent positive and negative words from the dataset can be found in Table 7 below.

Table 7. Breakdown of 25 most frequent positive and negative words

Sentiments of 25 Most Frequent Words

Sentiment coded using method from Bing (2005)

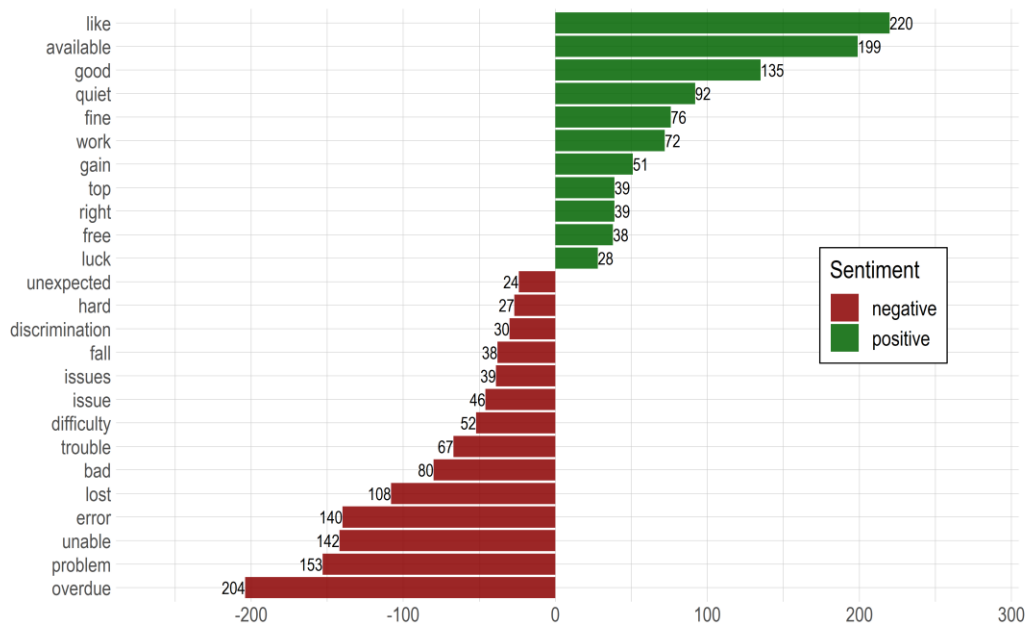
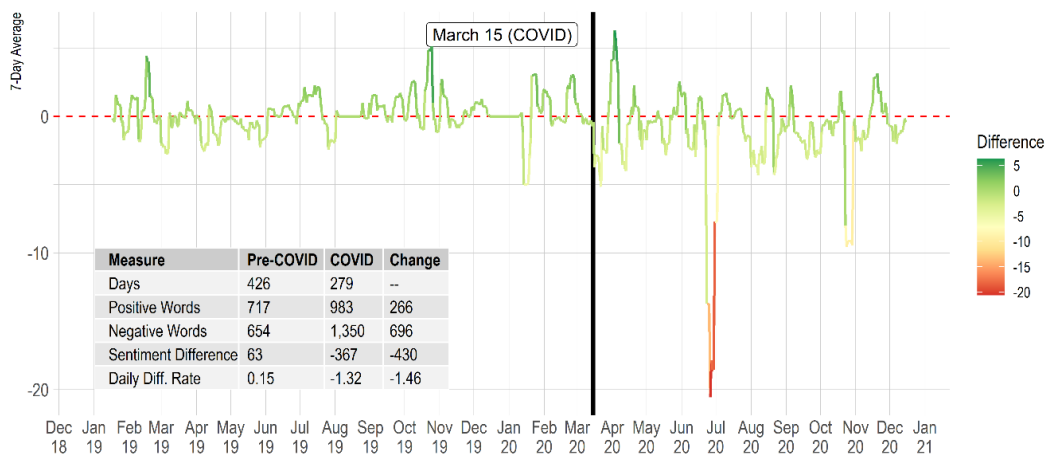


Table 8. Frequency of positive and negative sentiments monthly, 2019-2020

Frequency Difference Between Positive and Negative Sentiment Words

Line depicts 7-day moving average of the difference in frequency between positive and negative words.



For each day, net sentiment is calculated by subtracting the frequency of negative sentiment words from the frequency of positive sentiment words. Net sentiment is thus positive if more positive sentiment words occur than negative sentiment words and vice-versa. Days in which no chats are recorded were assigned a net sentiment of zero. Table 8

depicts the 7-day moving average of net sentiment and includes a summary table comparing Pre-COVID and COVID periods. Specifically, for each period the author calculated: (i) the frequency of positive and negative sentiment words, (ii) total net sentiment, and (iii) a per day net sentiment rate. Finally, for each of these values, the author calculated the change from Pre-COVID to COVID.

Although there was a high spike in net positive words early in COVID, the overall findings show that the sentiment was much lower during Summer and Fall 2020, as compared to year preceding COVID. The specific period during COVID of the most negative net sentiment occurred around July 2020, which was a period of high level of change and uncertainty for the university community, as patrons grappled with the university reopening and the implications of that for their university experience. This indicates that patrons who were approaching the library on chat felt more negatively than during the pre COVID period.

Limitations

The author acknowledges intercoder reliability is missing from this analysis with a single coder conducting the analysis. The analysis in this study should be considered a starting point to expand and improve upon in the future.

There are many more opportunities for analysis in this dataset. Currently the GSU library chats are capturing the demographics of the patron, such as university status (faculty, staff, student) or campus. The librarians also rate the difficulty of answering the question, and the patrons can rate their chat experience. The topics of the chats could all be analyzed and differentiated by these elements for further analysis.

Conclusion

It is important for libraries to appropriately assess their virtual reference efforts. As shown in previous research as well as in this study, knowing the types of chats that come into a library

offer a unique insight into how virtual reference should be trained, staffed, and implemented, and how the patron experience can be improved.

Such tagging would offer libraries unique assessment opportunities to see where the greatest needs of chat assistance would be by various departments. An increase in questions about circulation policies and the physical collection could indicate that this information was not readily available in other areas of the library website and should be expanded upon. It could also indicate that the departments that oversee those policies would need to be more involved in chat management and help. During COVID, there was an increase in the number of questions around circulation related policies, such as book retrieval, book pickup, fines, and fees. Research and reference-oriented departments manage the library's chat service, so the incorporation of the circulation department could have increased the library's quality of service during this time period.

The increase in net negative sentiments found during the COVID period can be an opportunity for libraries to train their staff to be aware that patrons often feel more negatively about their issue in question during times of societal unrest and crises. How each library chooses to address this issue is a unique decision, one of which could include offering more hands-on service and mediated referrals during this time to increase patron sentiment and potentially satisfaction. Chat transcripts offer a unique insight and opportunity for analysis for the betterment of library services and best support patron needs in times of crisis.

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