

» “Libraries allow children to ask questions about the world and find the answers. And the wonderful thing is that once a child learns to use a library, the doors to learning are always open.”

- LAURA BUSH

Strategic Library™



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Absentee Ballot Day in the Library

» **Empowering students to vote**

GWENDOLYN J. REECE

On September 25, 2018, American University Library held its inaugural Absentee Ballot Day, helping 1,005 students request absentee ballots. The library partnered with student government, the alumni association, and the League of Women Voters of the District of Columbia to empower our students in exercising their fundamental right and responsibility as citizens in a democracy. This article describes the reasoning behind this initiative, the planning process, and the event itself. The hope is that many academic libraries will join in this effort for the 2020 general election. Resources for institutions wishing to hold their own Absentee Ballot Day are included.

WHY ABSENTEE BALLOT DAY?

Libraries and universities have an interest in discouraging students from joining the party of nonvoters for several reasons. They are values-based institutions committed to such fundamental aims as the pursuit

of knowledge and promotion of human rights. Functionally, academia's educational mission is concerned with training new generations for positive participation in our society— not only in the economy, but also for active participation in democratic governance. Academia's research mission functions to create new knowledge—including knowledge that will never be profitable and therefore would not be created by business. Academic libraries have an additional responsibility for ensuring the preservation of knowledge for future generations. I dare to posit that if we, as academics, are producing graduates who are not engaged in our democracy, we have failed in our educational mission.

Apart from the idealist viewpoint, all institutions of higher education, including academic libraries, are financially dependent on government programs—including state school budgets, government-supported student financial aid, government-funded research grants, and nonprofit tax provisions. Furthermore, the fundamental values of academia and librarianship, such

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as an individual's right to privacy, can either be enhanced or harmed by government action. We need an informed and engaged citizenry. Academic institutions mostly focus on helping students become informed critical thinkers. Absentee Ballot Day is about increasing student engagement in shared governance. Many universities have robust voter registration drives, and we know that early voting experiences shape lifelong voter participation.^{1,2,3} However, college students face barriers to voting that registering students to vote at school may exacerbate.

Voting in the city where an institution is located can be difficult for students. Students move frequently and must change their voter registration every time they relocate, which presents a barrier to participation. Moreover, students often are deeply tied to their home jurisdictions, making their voices valuable in local politics at home. Many plan to return to their home district upon graduation and will experience the long-term effects of any political decisions made while away at school. They should have a voice in those decisions. For the nearly 80,000 students a year who attend one of the nine colleges in Washington, D.C., including American University, there are additional barriers. Residents of the District of Columbia do not have full rights as citizens, including voting rights.⁴ This adds another confusing issue for our students to navigate. Students studying in the District of Columbia but voting in their home districts elect voting members of Congress, as opposed to the nonvoting representatives elected from the District of Columbia.

Although it is often preferable for students to vote in their home jurisdiction, many, even in-state students, cannot physically go to the polls. Having to travel and taking time away from school and/or work may be impossible. These obstacles are especially potent for low-income students. Voting absentee is an option for most students who are away at college to participate in elections. Requesting an absentee ballot presents its own challenges. Each state has a different process and requires different forms. Some jurisdictions have additional requirements that can be difficult to navigate, such as ID, signed witnesses, or hard-to-find information. Additionally, many of our students have no experience with "snail mail," nor with paper forms that do not incorporate



Absentee Ballot Day promotional poster, design by Erica Bethel.

automatic skip logic. We discovered that leaving fields blank caused significant anxiety. Academic libraries have an information literacy mission to help students learn to use information for the purposes of being engaged citizens, not just for succeeding at university. This includes learning to navigate government information and identify reputable nonpartisan resources in order to make informed electoral decisions. Given all these factors, American University Library decided to hold Absentee Ballot Day on National Voter Registration Day, which is the last day to register to vote and be guaranteed to meet the registration deadlines in all states.

PARTNERS AND ETHICS

The library reached out to student government about assisting with the event in August 2018. Student government wanted to do more voter empowerment, but the early fall deadlines are difficult since student government officers change annually and are often away during the summer. The planning for events like this must be largely complete before they return to campus, so they were grateful we provided some stability for the initiative and did the planning.

We were grateful to them for doing marketing and outreach, which was more effective than the library could accomplish on its own. They also brought volunteers on the day of the event.

Our alumni association was already

registering students to vote in the District of Columbia, which is troublesome given the lack of full voting rights described above. When I explained what we were doing, they joined and brought volunteers to the event. Finally, we worked with the League of Women Voters (LWV) of the District of Columbia. LWV is a strictly nonpartisan organization dedicated to citizen empowerment. They run VOTE411, which provides nonpartisan information on every race, including distributing the same survey to every candidate on even the most local elections and providing the answers so that voters can compare. They also provide nonpartisan analysis of what ballot measures mean. The LWVDC sent volunteers and provided us with cards about VOTE411.

It was crucial to us to be nonpartisan and strictly impartial about empowering people to vote. We chose our partners carefully and had volunteer instructions that articulated this commitment.

"This is ABSOLUTELY a non-partisan event. We cannot make any comment about any elected official, any candidate or any party during this event."

PLANNING

I proposed the project and, once approved by the university librarian, became the project coordinator. I created an overall plan and then invited relevant parties to a series of working meetings. I went through VOTE411 for each state and identified all that needed IDs or had unusual requirements. I also tested and chose a portal site. An important early step was determining the scope of what we would be providing.

The cost was minimal. We offered:

- Stamps
- Envelopes
- Printing the forms
- Photocopies of IDs
- Assistance understanding forms
- We mailed the sealed, stamped envelopes
- Signed witnesses, where required
- Finding unusual information when necessary (original number associated with voter registration or codes for local precincts, etc.)
- VOTE411 cards
- "I registered Absentee!" stickers

We also decided to provide support to students once they received their absentee ballots. They could bring their ballot to the borrowing desk for a stamp. If they needed

a signed witness, we would sign for them. Working closely with library IT and building monitors, we planned our physical setup and did a full walk-through with them and with our partners who would be bringing volunteers. Some considerations were that the space needed to be tolerant of noise and able to handle lines. It took each student about ten minutes to fill out their paperwork. We had about a dozen computers. (We could have doubled that number.) We needed a printer/copier for printing the forms and copying IDs. This required a special power outlet and, therefore, partly determined our layout.

Student government was essential to our communication plan. They wrote several messages to the whole student body and posted them on their social media accounts. The library and our partners also promoted the event through social media. The library contacted the student newspaper to get an advanced story placed and hung posters around campus, on the library's front doors, and on our shuttles. The library's graphic designer created "I registered absentee" stickers on the model of the "I voted" stickers, and students wearing them generated word-of-mouth awareness. We also had volunteer "barkers" with signs wandering around campus the day of the event, telling students about it.

Prior to the event, we determined that we needed to make it easy for students to mail their applications, but we didn't want them to go through campus mail. We worked with our campus UPS store to buy stamps and to take the mail. We created a sealed box with a slot and always had a volunteer with it. At the end of the night, the box with the applications was locked in a private office until it was taken to the UPS store the next morning.

The planning team created a basic volunteer schedule. On the day of the event, there was always at least one member of the planning team present.

WHAT WE DID

We staffed from 8 a.m. until 10 p.m., although we actually were available until 11 p.m., because we would not turn anyone away who was in line. We dedicated computers and a printer/copier. A white board listed states with voter ID requirements, and we added other unusual things as we found them. We made two copies of IDs, one for the application, another for the ballot.

Volunteers helped with way-finding, managed printing and copying, helped students navigate and understand the forms, distributed stamps and envelopes, told them about VOTE411, and instructed them to come back for a stamp or signature if they needed one when they got their ballot.

By the afternoon, the line wrapped all around the first floor of the library. We had students who patiently stood in line for an hour to participate. Students who had already registered brought their friends and stood in line with them again. For many members of the library staff, this was deeply moving.

WHAT THEY LEARNED

Students gained experience in navigating some government resources, and we were able to direct them to VOTE411 as a model of a powerful nonpartisan tool for election information. They learned about paper mail and forms (many did not know how to address an envelope) along with experiencing a library as a place that empowers them to exercise their rights in a democracy. We hope they will carry this with them through-out their lives when they think about other libraries. Student comments demonstrated their realizations about our political system, like recognizing the differences in states' barriers, as they stood in line with students whose home states had removed or erected barriers.

GOING FORWARD

American University Library will offer this event again this year. We encourage other

academic libraries to join us in the effort to increase student absentee voting for the 2020 general election, and are excited that several have committed to doing so. Our toolkit provides information for planning, including editable documents. Contact me by email or join our event listserv to learn more. Together, we can increase our students' engagement and participation in the upcoming general election. ■

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ABOUT THE AUTHOR: Gwendolyn J. Reece is associate university librarian and director of research, teaching, and learning at the American University Library; email: greece@american.edu

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Using Integrated Library Systems and Open Data to Analyze Library Cardholders

BY GREG SOHANCHYK AND DAN BRIEM

The Harrison Public Library in Westchester County, New York operates two library buildings in Harrison: The Richard E. Halperin Memorial Library Building (the library's main building, located in downtown Harrison) and a West Harrison branch location. As part of its latest three-year strategic plan, the library sought to use existing resources to improve understanding of its cardholders at both locations.

To do so, we needed to link the circulation data in our integrated library system, Evergreen, to geographic data and demographic data. We decided to build a geodemographic heatmap that incorporated all three aforementioned types of data. Using Evergreen, American Community Survey (ACS) data, and Google Maps, we plotted each cardholder's residence on a map, added census boundaries (called tracts) and our town's borders to the map, and produced summary statistics for each tract detailing its demographics and the library card usage of its residents. In this article, we describe how we acquired the necessary data and built the heatmap. We also touch on how we safeguarded the data while building the heatmap, which is an internal tool available only to select authorized staff members. Finally, we discuss what we learned from the heatmap and how libraries can use open data to benefit their communities.

PROJECT RATIONALE

While drafting its latest three-year strategic plan, the library sought to gain a holistic understanding of its users. The library conducted a survey to give its users an opportu-



#	Source Path	Column Label	Data Type	Field Transform
1	ILS User -> Home Library (all)	Home Library	text	Filter Date
2	ILS User -> Mailing Address (all)	Street 1	text	Filter Date
3	ILS User -> Mailing Address (all)	Street 2	text	Filter Date
4	ILS User -> Mailing Address (all)	Postal Code	text	Filter Date
5	ILS User -> Mailing Address (all)	City	text	Filter Date
6	ILS User -> Mailing Address (all)	State	text	Filter Date
7	ILS User -> All Circulations (all)	Checked Out Date/Time	Timestamp	Last Value

Figure 1. Screenshot of ILS user report we pulled. Physical address fields are out of frame, but were pulled in the same manner as mailing address fields.

nity to describe themselves, their needs, and their recommendations for the library's future. Furthermore, as a complement to the survey, we wanted to perform an additional analysis using existing data to see what else we could learn about the library's users.

We first discussed what we wanted to learn from this additional analysis and established the following objectives:

- Identify where in Harrison each building's cardholders live.
- Identify where active cardholders live (i.e., those who have used their card recently).
- Identify where non-active cardholders and non-cardholders live.
- Identify if there exists a clear divide between where our West Harrison branch's cardholders live and where cardholders of a third library in Harrison live.
- Examine relationships between socioeconomic metrics (e.g., income, age) and library card use.

We agreed that we wanted to present our findings in the form of an interactive data visualization, and given that many of our objectives concerned location, decided

to build a geodemographic heatmap. Our first goal was to link the circulation data in our integrated library system, Evergreen, to geographic data and demographic data.

INITIAL DATA COLLECTION AND CLEANING Cardholder Data

Our integrated library system, Evergreen, provides data for all libraries in the Westchester Library System, of which the Harrison Public Library is a member. We pulled an ILS User report in Evergreen for the following metrics:

- Home Library: The library building with which cardholders have registered their library card.
 - Harrison is rather spread out and is home to three library buildings. We pulled information about cardholders for all three buildings: Our main library building and its West Harrison branch, as well as the third building, the Purchase Free Library, which is located close to our West Harrison branch. We pulled this information in order to examine if there is any noticeable demarcation between where our West Harrison branch

» **Data cleaning consisted of cleaning typos and other issues found in each section of the addresses. It was essential to make sure the addresses were clean because we would need to get a coordinate set (latitude, longitude) for each address and had to have the addresses formatted in a specific manner (more on this in Geocoding).**

library's cardholders reside and where the Purchase library's cardholders reside. Note that Harrison residents are allowed to sign up for a library card with any of the three buildings.

- Max Checkout Date/Time: Date of most recent checkout. Evergreen appears to store this information for approximately six months for each cardholder. If a cardholder had a checkout date in the past six months, we considered the cardholder to be an active cardholder.
- For Mailing Address and Physical Address:
 - Street (1): Residence number and street name.
 - Street (2): Most commonly filled in for apartments (e.g., Apt 4A).
 - City
 - State
 - Postal Code
- ID: We then assigned each cardholder in the report a unique integer ID.

DATA CLEANING

Data cleaning consisted of cleaning typos and other issues found in each section of the addresses. It was essential to make sure the addresses were clean because we would need to get a coordinate set (latitude, longitude) for each address and had to have the addresses formatted in a specific manner (more on this in Geocoding). We cleaned data for each part of both mailing and physical addresses, and the majority of our data cleaning consisted of the following:

- Street (1)
 - Made all text UPPER CASE.
 - Made street names uniform. For example:
 - Displayed variations of 'street' as 'ST.'
 - Displayed variations of 'avenue' as 'AVE.'
 - Displayed variations of 'court' as 'CT.'
 - Displayed variations of 'road' as 'RD.'
 - Deleted leading spaces.

- Moved P.O. Box and apartment data from 'Street (1)' to 'Street (2).'
- Street (2)
 - Moved city and state data to appropriate fields.
- City
 - Corrected misspelled city names, with a focus on variations of "Harrison."
 - Moved state and zip code data to appropriate fields.
- State
 - Changed state name written out in full and state abbreviation written with periods to two-letter abbreviation in ALL CAPS with no spaces (e.g., NY).
 - Deleted leading spaces.
 - Moved zip code data to the appropriate field.
- Postal Code
 - Removed non-numeric characters.
 - Fixed zip codes that were four or six digits long by using the rest of the address on file to determine which digit to add or delete (often the first or last digit).
 - Moved city and state data to appropriate fields.

We then stored this data as a CSV formatted file.

AMERICAN COMMUNITY SURVEY (ACS) DATA

The American Community Survey (ACS) is conducted every month by the United States Census Bureau. It is sent to a sample of about 3.5 million addresses in the fifty states, District of Columbia, and Puerto Rico. The ACS asks about topics not on the census, such as education, employment, internet access, and transportation¹.

In order to get separate data for as many areas of Harrison as possible, we chose to pull ACS data by census tract. Census tracts are geographic entities within counties (or

the statistical equivalent of counties). There were 74,134 tracts defined for the 2010 census in the U.S. and its territories². Per the United States Census Bureau³: "Census tract boundaries normally follow visible features, but may follow legal geography boundaries and other non-visible features in some instances. Census tracts ideally contain about 4,000 people and 1,600 housing units." As we learned when building the map itself, Harrison is divided into seven census tracts.

The ACS offers data as 1-year estimates and 5-year estimates. 5-year estimates consist of sixty months of collected data (e.g., 2013-2017 ACS 5-year estimates are produced using data collected between January 1, 2013 and December 31, 2017), and can be used to examine census tracts and other smaller geographies because 1-year estimates are not available⁴. Because there was no option to download data for census tracts by town, we downloaded 2013-2017 ACS 5-year estimates data for every census tract in Westchester County for the following metrics using the now decommissioned American FactFinder tool on the United States Census Bureau's website (ACS data can now be found at American Community Survey Data⁵) and stored the data as a CSV:

- **Census Tract (Full):** "Census Tract" + Number (e.g., Census Tract 84, Census Tract 84.02), County Name, State Name
- **Total Population:** Included in the ACS, produced by Population Estimates Program⁶.
- **Households; Estimate; Median income (dollars)**
- **Total; Estimate; Median age (years)**
- **Unemployment rate; Estimate; Population 16 years and over**
- **Percent; Estimate; Percent high school graduate or higher**
- **Percent; Estimate; Percent bachelor's degree or higher**
- **Percent; Estimate; Population 25 years and over – Graduate or professional degree**

```

1 <?php
2 header('Content-Type: text/csv; charset=utf-8');
3 header('Content-Disposition: attachment; filename=result.csv');
4
5 $csv = "";
6
7 if ($handle = fopen('addresses.csv', 'r')) {
8
9     while($row = fgetcsv($handle, 9999, ',')) {
10
11         $id = $row[0];
12         $address = urlencode(implode(" ", array_splice($row, 1)));
13
14         $key = ""; // API key redacted
15         $url = "https://maps.googleapis.com/maps/api/geocode/json?address=$address&key=$k
16 ey";
17
18         $ch = curl_init();
19         curl_setopt($ch, CURLOPT_URL, $url);
20         curl_setopt($ch, CURLOPT_RETURNTRANSFER, true);
21         curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, true);
22         curl_setopt($ch, CURLOPT_SSL_VERIFYHOST, 2);
23         $json = json_decode(curl_exec($ch), true);
24
25         if ($json['status'] == 'OK') {
26
27             $add = $json['results'][0]['formatted_address'];
28             $place = $json['results'][0]['place_id'];
29             $lat = $json['results'][0]['geometry']['location']['lat'];
30             $lng = $json['results'][0]['geometry']['location']['lng'];
31
32             $csv .= "$id,$add,$place,$lat,$lng\n";
33
34         } else {
35             $csv .= "$id,,,\n";
36         }
37     }
38     curl_close($ch);
39 }
40 fclose($handle);
41
42 echo $csv;

```

Figure 2

Obtaining this data for each census tract in Harrison allowed us to use the heatmap to infer characteristics about our cardholders based on how they were distributed throughout the town's census tracts. We pulled total population data by tract to estimate the percentage of residents in each tract that have library cards, and chose the other metrics to study the validity of our most common observations from working in the library each day. For example, a significant portion of library visitors appear to be senior citizens, and we wanted to study, for example, if there were relatively high concentrations of cardholders in parts of town with high median ages. We also wanted to study the overall relationship between age and library card use. Furthermore, we notice that many people use library computers to apply for jobs, so we wanted to include unemployment data. Finally, income and educational attainment are standard measures of wealth and social status, and we

wanted to test hypotheses such as whether there is an inverse relationship between wealth and library card use (perhaps because those who are better off financially may feel they don't need to use library resources).

GEOCODING

Google Maps Geocoding API

To build a heatmap using Google Maps, we first had to create a project in the Google Cloud Platform Console, and add a Google Maps Geocoding API key⁷ to the project. Note that Google will ask for billing information, and the Geocoding API uses a pay-as-you-go pricing model⁸. We set up a new account in such a way that there was a free credit promotion that we were able to complete the project without having to pay anything.

Note that Google has a set of stringent rules for its Geocoding API⁹ and Google Maps¹⁰. We've linked to both pages, and encourage those interested in using these

platforms to visit them to read the current policies. Notably, on its Geocoding API Policies page¹¹, Google states:

If you want to display Geocoding API results on a map, then these results must be displayed on a Google Map. It is prohibited to use Geocoding API data on a map that is not a Google map.

GETTING A COORDINATE SET FOR EACH ADDRESS

Next, to plot each cardholder's residence, we had to get a coordinate set for each address. We decided to geocode the physical addresses we pulled from Evergreen because they are the addresses displayed on cardholders' IDs (e.g., driver's license) at card signup. As mentioned in Initial Data Collection and Cleaning, it was essential to clean the addresses because we had to have them formatted in a specific manner in order to submit geocoding requests to Google Maps using the Geocoding API¹².

Geocoding API is accessed through an HTTP interface. Requests must be formatted in the same manner as the following¹³:

https://maps.googleapis.com/maps/api/geocode/json?address=1600+Amphitheatre+Parkway,+Mountain+View,+CA&key=YOUR_API_KEY

We used a PHP script on a locally running Windows/Apache/MySQL/PHP (WAMP) stack to make the Geocoding API requests. The same script parsed the JSON responses, linked the parsed responses with the unique cardholder IDs, and formatted them in two CSV files, which we combined manually. We had to make requests in batches so we wouldn't exceed execution times or memory max on the local server. We set up the local WAMP server with a longer than default PHP process time, increased memory for requests, and set up an SSL certificate to make sure we were sending requests encrypted. We also cached the DNS request to the base URL so it didn't need to do a lookup when we were sending data in the URLs. The requests were not asynchronous so the next request happened after the previous one was processed, and there was no need to delay timing on the requests to comply with Google's terms of service.

See **figure 2** for the script we used to submit geocoding requests and parse the JSON responses.

The information we pulled using the script are lines 4, 7, 8 and 22 in the following sample geocoding response (**Figure 3**), in JSON¹⁴:

```

1  {
2  «results» : [
3  {
4    «formatted_address» : "1600 Amphitheatre Pkwy, Mountain View, CA 94043, USA",
5    «geometry» : {
6      «location» : {
7        «lat» : 37.4267861,
8        «lng» : -122.0806032
9      },
10     «location_type» : "ROOFTOP",
11     «viewport» : {
12       «northeast» : {
13         «lat» : 37.4281350802915,
14         «lng» : -122.0792542197085
15       },
16       «southwest» : {
17         «lat» : 37.4254371197085,
18         «lng» : -122.0819521802915
19       }
20     }
21   },
22   «place_id» : "ChIJtYuu0V25j4ARwu5e4wwRYgE",
23   «plus_code» : {
24     «compound_code» : "CWC8+R3 Mountain View, California, United States",
25     «global_code» : "849VCWC8+R3"
26   },
27   «types» : [ "street_address" ]
28 }
29 ],
30 «status» : "OK"
31 }

```

Figure 3

GETTING CENSUS GEOGRAPHIES FOR EACH ADDRESS

The Census Bureau has a free geocoder that can provide locations' census geographies (state, county, tract, and block). The geocoder is available as a web interface and as an API, and can handle up to 10,000 requests in batch mode¹⁵. After getting an API key, we once again used PHP on a locally running WAMP stack to make the geocoding API requests for the census geocoder, parsed the JSON responses, linked the parsed responses with the unique cardholder IDs, and formatted them in two CSV files, which we combined manually. We set up the local WAMP server with a longer than default PHP process time, increased memory for requests, and set up an SSL certificate to make sure we were sending requests encrypted. We also cached the DNS request to the base URL so it didn't need to do a lookup when we were sending data in the URLs. We submitted census geocoding requests using the coordinates we got from Google when we geocoded cardholders' physical addresses.

Below is a sample geocoding request using the coordinates of the New York Public Library's main branch, where 'x' is longitude and 'y' is latitude:

<https://geocoding.geo.census.gov/geocoder/geographies/coordinates?x=-73.9818&y=40.75225&benchmark=8&vintage=8&format=json>

Note that when we performed the study, we had 'benchmark' and 'vintage' at their 2017 settings, to match the census tracts from which we pulled data using the 2013-2017 ACS 5-year estimates. Benchmark and vintage must be included to get census geographies¹⁶.

See **figure 5** for is the script we used to submit geocoding requests and parse the JSON responses.

The census geographies we pulled using this script are lines 22, 36, 45, 56, 67, and 78 in **figure 6** from the JSON response for the New York Public Library request:

Note that there is also an option to feed addresses through the census geocoder to get census geographies and coordinates. We tested this option, but we decided to use the coordinates we got using the Google Geocoding API over those of the census

geocoder because we got more accurate results from Google. The census geocoder documentation mentions that it "takes the address and determines the approximate location offset from the street centerline"¹⁵. We checked some of the coordinates the census geocoder returned and indeed found that it generally returned coordinates for nearby cross streets rather than exact addresses, while Google generally returned coordinates for exact addresses.

After obtaining census geographies, we cleaned census tract information in the following manner to get Census Tract Code:

- We isolated the number from the census tract information pulled from the JSON (e.g., 84 from "Census Tract 84").
 - If the Census Tract Number was a whole number, we added two zeroes to the end of it (e.g., 84 -> 8400).
 - If the Census Tract Number was a decimal, we removed the decimal (e.g., 84.02 -> 8402).

We were not affected by the fact that there are census tracts with the same number across multiple states since we decided to display on the map census tract boundaries for Harrison only.

FINAL DATA SETS

After the initial data collection, cleaning, and geocoding were complete, we had the two principal data sets we needed to build the heatmap.

Principal Cardholder Data Set

Our final cardholder data set consisted of the following columns for each cardholder:

- **ID:** Unique integer identifier.
- **Home Library:** The library building with which cardholders have registered their library card. Recall that we pulled information for the three library buildings in Harrison: Our main library building and its West Harrison branch, as well as the Purchase Free Library, which is located

	id	total_population	median_income_hh	median_age	unemployment_rate	high_school	bachelors	prof_degree
	101	4732	35026	32	12.1	73.6	16.8	8.5
	103	4674	27957	31	10.6	73.2	15.3	8.0
	104	21	NULL	NULL	0.0	100.0	0.0	0.0
	201	8312	37831	32	11.5	61.5	12.0	1.6
	202	4076	69154	39	6.6	74.8	31.2	17.8
	203	3500	54637	40	6.8	87.6	40.1	19.4
	300	4541	31635	37	10.2	58.3	14.1	3.9
	401	4030	51144	34	8.5	77.3	41.2	18.8
	402	4889	32029	36	10.8	78.2	19.2	7.1
	500	3772	21074	35	4.0	55.0	8.7	2.8

Figure 4. ACS data for census tracts in Westchester County stored in MySQL (partial).

<pre> 1 <?php 2 header('Content-Type: text/csv; charset=utf-8'); 3 header('Content-Disposition: attachment; filename=result.csv'); 4 5 \$csv = ""; 6 7 \$base_url = 'https://geocoding.geo.census.gov/geocoder/geographies/coordinates'; 8 \$benchmark = '4'; // Integer – We have put '4' for the most current setting as a 9 // placeholder (as 2017 settings are no longer available) 10 \$vintage = '4'; // Integer – We have put '4' for the most current setting (as 11 // 2017 settings are no longer available) 12 \$key = ""; // API key redacted 13 14 // Send geocoding requests using coordinates 15 if (\$handle = fopen('coordinates.csv', 'r')) { 16 17 while(\$row = fgetcsv(\$handle, 9999, ',')) { 18 19 \$id = \$row[0]; 20 \$x = \$row[2]; 21 \$y = \$row[1]; 22 23 \$tract = ""; 24 25 \$url = "\$base_url?x=\$x&y=\$y&benchmark=\$benchmark&vintage=\$vintage&format=json 26 &key=\$key"; 27 28 \$ch = curl_init(); 29 curl_setopt(\$ch, CURLOPT_URL, \$url); 30 curl_setopt(\$ch, CURLOPT_RETURNTRANSFER, true); 31 curl_setopt(\$ch, CURLOPT_SSL_VERIFYPEER, true); 32 curl_setopt(\$ch, CURLOPT_SSL_VERIFYHOST, 2); 33 \$json = json_decode(curl_exec(\$ch), true); 34 35 // PULL STATE, COUNTY, AND CENSUS TRACT INFORMATION FROM JSON 36 37 if (\$json && array_key_exists('result', \$json)) { 38 39 if (array_key_exists('geographies', \$json['result'])) { 40 41 if (empty(\$json['result']['geographies']['Census Tracts'])) { 42 if (array_key_exists('NAME', 43 \$json['result']['geographies']['Census Tracts'][0])) { 44 \$tract = \$json['result']['geographies']['Census Tracts'][0]['NAME']; 45 } </pre>	<pre> 46 47 if (empty(\$json['result'] 48 ['geographies']['Counties'])) { 49 if (array_key_ 50 exists('NAME', 51 \$json['result']['geographies']['Counties'][0])) { 52 \$tract .= ',' . 53 \$json['result']['geogra- 54 phies']['Counties'][0]['NAME']; 55 } 56 } 57 58 if (empty(\$json['result'] 59 ['geographies']['States'])) { 60 if (array_key_ 61 exists('NAME', 62 \$json['result']['geographies'] 63 ['States'][0])) { 64 \$tract .= ',' . 65 \$json['result']['geog- 66 raphies']['States'][0]['NAME']; 67 } 68 } 69 } 70 } 71 } 72 } 73 74 if (\$tract) { 75 \$csv .= "\$id,\"\$tract\"\n"; 76 } else { 77 \$csv .= "\$id,\n"; 78 } 79 curl_close(\$ch); 80 } 81 fclose(\$handle); 82 83 echo \$csv; </pre>
---	--

Figure 5

- close to our West Harrison branch. Harrison residents are allowed to sign up for a library card with any of the three buildings.
- **Date of Most Recent Checkout:** Within the past six months. If a cardholder had a checkout date in the past six months, we considered the cardholder to be an active cardholder.
 - **Latitude and Longitude:** Coordinates of cardholder's address (as separate columns).
 - **State Name:** For state in which cardholder's address is located.
 - **County Name:** For county in which cardholder's address is located.
 - **Census Tract Code:** Census tract in which cardholder's address is located. Note that this code will contain only numbers. This

column was used to link the cardholder data to the ACS data.

Principal American Community Survey (ACS) Data Set

Our final ACS data set had the following information for all census tracts in Westchester County:

- **Census Tract Code:** Served as the ID for the ACS data, used to link the ACS data to the cardholder data.
- **Total Population**
- **Households; Estimate; Median income (dollars)**
- **Total; Estimate; Median age (years)**
- **Unemployment rate; Estimate; Population 16 years and over**
- **Percent; Estimate; Percent high school graduate or higher**

- **Percent; Estimate; Percent bachelor's degree or higher**
- **Percent; Estimate; Population 25 years and over – Graduate or professional degree**

We then stored both data sets as tables in a MySQL database.

BUILDING THE MAP

To build the heatmap using Google, we had to add a Maps JavaScript API key¹⁷ to our project in Google Cloud Platform Console. Next, we created a heatmap layer, queried the coordinates from the principal cardholder data set in MySQL, and plotted the coordinates of each cardholder's physical address on to the map using the Maps JavaScript API¹⁸.

Though we plotted all cardholders'

<pre> 1 { 2 «result»: { 3 «input»: { 4 «benchmark»: { 5 «id»: «8», 6 «benchmarkName»: “Public_AR_ACS2019”, 7 «benchmarkDescription”: “Public Address Ranges - ACS2019 Benchmark”, 8 «isDefault”: false 9 }, 10 «vintage»: { 11 «id»: «8», 12 «vintageName”: “Current_ACS2019”, 13 «vintageDescription”: “Current Vintage - ACS2019 Benchmark”, 14 «isDefault”: true 15 }, 16 «location»: { 17 «x»: -73.9818, 18 «y»: 40.75225 19 } 20 }, 21 «geographies»: { 22 «States»: [23 { 24 «STATENS»: «01779796», 25 «GEOID»: «36», 26 «CENTLAT»: «+42.9198015», 27 «AREAWATER»: 19244881040, 28 «STATE»: «36», 29 «BASENAME»: «New York», 30 «STUSAB»: «NY», 31 «OID»: 27490100833860, 32 «LSADC»: «00», 33 «FUNCSTAT»: «A», 34 «INTPTLAT»: «+42.9133974», 35 «DIVISION»: «2», 36 «NAME»: «New York», 37 «REGION»: «1», 38 «OBJECTID»: 39, 39 «CENTLON»: «-075.5942771», 40 «AREALAND»: 122050448177, 41 «INTPTLON»: «-075.5962723», 42 «MTFCC»: «G4000» 43 } 44], 45 «Counties»: [</pre>	<pre> 46 { 47 «GEOID»: «36061», 48 «CENTLAT»: «+40.7741301», 49 «AREAWATER»: 28551431, 50 «STATE»: «36», 51 «BASENAME»: «New York», 52 «OID»: 27590460844234, 53 «LSADC»: «06», 54 «FUNCSTAT»: «C», 55 «INTPTLAT»: «+40.7766419», 56 «NAME»: «New York County», 57 «OBJECTID»: 2446, 58 «CENTLON»: «-073.9698320», 59 «COUNTYCC»: «H6», 60 «COUNTYNS»: «00974129», 61 «AREALAND»: 58680717, 62 «INTPTLON»: «-073.9701871», 63 «MTFCC»: «G4020», 64 «COUNTY»: «061» 65 } 66], 67 «Census Tracts»: [68 { 69 «GEOID»: «36061008400», 70 «CENTLAT»: «+40.7519695», 71 «AREAWATER»: 0, 72 «STATE»: «36», 73 «BASENAME»: «84», 74 «OID»: 20790460864064, 75 «LSADC»: «CT», 76 «FUNCSTAT»: «S», 77 «INTPTLAT»: «+40.7519695», 78 «NAME»: «Census Tract 84», 79 «OBJECTID»: 43639, 80 «TRACT»: «008400», 81 «CENTLON»: «-073.9840942», 82 «AREALAND»: 173067, 83 «INTPTLON»: «-073.9840942», 84 «MTFCC»: «G5020», 85 «COUNTY»: «061» 86 } 87] 88 } 89 } 90 } </pre>
--	--

Figure 6

locations, we chose to display census tract boundaries (and ACS data) for only Harrison’s census tracts, as the overwhelming majority of cardholders live in Harrison (and you have to be a town resident to sign up for a library card with any of its three library buildings, anyway).

To display these boundaries, we downloaded TIGER/Line shapefiles for Harrison’s border and the boundaries of the census tracts within the town as KML layers from the census website²⁰ and used the Maps JavaScript API to add these boundaries to the map²¹. It helped us to have the KML files served with headers from an actual server instead of linked locally in directories when importing.

Figure 8 shows the basic structure of what we did to create the map, load

the KML layers, load the coordinates, and create the heat map layer. The code below assumes certain variables are populated, and we named the variables in a manner to make that clear.

Finally, we added tooltips that appear when users click on a census tract. We had to wire up interactivity to filter data based on the chosen tract and then format each tooltip, which displays cardholder summary statistics for each census tract in Harrison and ACS data for all residents in each tract. We also added interactivity to filter coordinates plotted based on cardholders’ home library. The data displayed on the map and the tooltips were all pulled from the cardholder and ACS data tables in our MySQL database.

CONCLUSIONS

The Map

In this section, we will discuss our conclusions from the final heatmap. As a guide, we have included the following image of the map without the coordinates plotted (see figure 9). Note how Harrison is divided into seven census tracts. The downtown library is located in the southeast corner of Harrison and is marked as HAR. The library’s West Harrison branch is located in northwestern Harrison and is marked as W. HAR. The Purchase Free Library is also located in northern Harrison and is marked as PUR. As previously mentioned, the Harrison Public Library operates the downtown library and the West Harrison branch, and these buildings’ abbreviations have been underlined.

```

1 // Initialize Google map
2 const map = new google.maps.Map(document.getElementById, {
3   zoom: 13,
4   minZoom: 12,
5   maxZoom: 15,
6   center: {lat: initLat, lng: initLng},
7   styles: mapStyles // Custom Google Map feature types, colors, etc.
8 });
9
10 // Render KML layers
11 const kmlLayers = data.censusTracts.map(tract =>
12   new google.maps.KmlLayer({
13     url: tract.url, // Header from a server
14     preserveViewport: true,
15     map: map
16   })
17 );
18
19 // Translate coordinates to Google Map coordinates
20 // We pulled this data from the principal cardholder data table in MySQL
21 const coordinates = data.coordinates.map(coordinateSet =>
22   new google.maps.LatLng(
23     parseFloat(coordinateSet['latitude']),
24     parseFloat(coordinateSet['longitude'])
25   )
26 );
27
28 // Render heatmap
29 const heatmap = new google.maps.visualization.HeatmapLayer({
30   data: coordinates,
31   map: map,
32   radius: 10,
33   opacity: 0.9,
34   dissipating: true,
35   maxIntensity: 10
36 });

```

Figure 7



Figure 8. An example of a heatmap as shown on Google’s Heatmaps documentation page¹⁹.

Home Library in Harrison

Our library’s cardholders – both for the downtown library and its West Harrison branch – overwhelmingly come from the census tracts closest to each library building. The downtown library is located almost exactly on the border between the two census tracts that comprise Harrison’s downtown district, and these two census

tracts (which make up a densely populated downtown/residential area) contain the majority of the cardholders whose home library is our main library. There is, however, a cluster of main library cardholders across town in the West Harrison branch’s census tract, which could indicate either that West Harrison residents use the downtown building over their local branch, or simply that West

Harrison residents stated that they wanted to register for a card at the “Harrison” library at signup and chose the main building by default. Similarly, an overwhelming majority of the cardholders whose home library is our West Harrison branch are located in the same census tract as our branch, and this tract encompasses a relatively small, but densely populated, residential area.

The Purchase Free Library is located at the center of Harrison’s wealthiest census tract, and its cardholders are scattered throughout this sparsely populated tract. To our surprise, relatively few of its cardholders live in the same tract as our West Harrison branch despite the close proximity of the two libraries. In fact, although they live in the same census tract as the Purchase library, there is a cluster of Purchase cardholders who live in the area outlined by the orange oval in the **figure 10** who actually live closer to our West Harrison branch than to the Purchase library. To the west, only a small wooded area separates their neighborhood and our branch library’s census tract, and to the east of this neighborhood – between the homes and the Purchase library – is a country club. This observation regarding home library demonstrates the perceived cultural differences between the residents in this part of town even though they live so close to each other.

DISCOVERIES ABOUT CARDHOLDERS OF THE TWO HARRISON PUBLIC LIBRARY BUILDINGS

Clicking on a census tract in the heatmap displays a tooltip that shows summary statistics for the tract detailing its demographics and the library card usage of its residents.

We noticed that, at the extremes, there is an inverse relationship between median household income and the percentage of active cardholders (number of cardholders who checked out material in the past six months divided by the total number of cardholders) by census tract, which supports our hypothesis about the relationship between wealth and library card use. The Harrison census tract that is first in median household income has the lowest active cardholder percentage, while the tract that is second to last in median household income has the highest active cardholder percentage. We did not, however, observe any relationship between median household income and active cardholder percentage for the census tracts more towards the middle of Harrison’s household income range. It is worth noting, however, that despite their differ-



Figure 9. Harrison divided into its census tracts with its three libraries' locations shown.

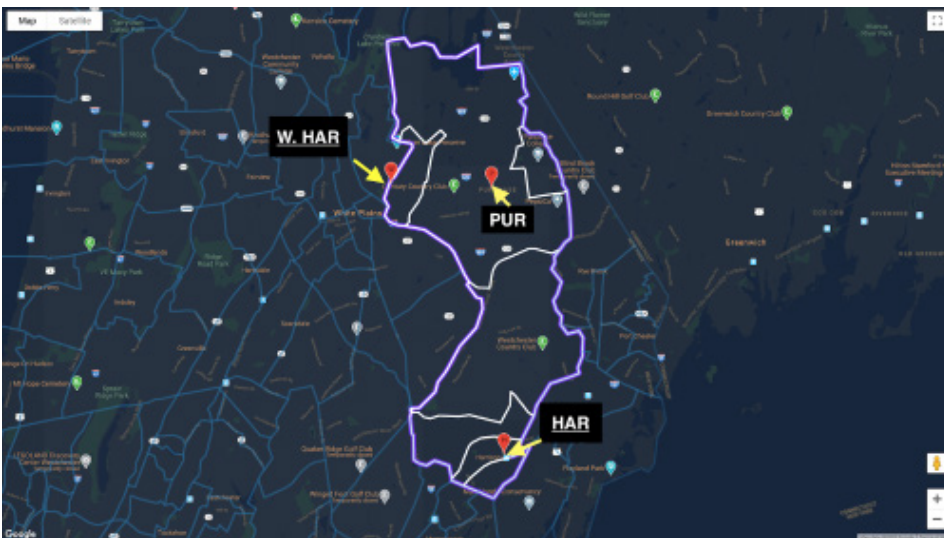


Figure 10. There is a cluster of Purchase cardholders who live in the area marked by the orange oval. These Purchase cardholders actually live closer to the West Harrison branch library than to the Purchase library.

ences, all census tracts in Harrison have median household incomes above the national median household income, and examining this simple measure of central tendency by census tract does not capture the entirety of the town's economic landscape.

We did not notice from this map a densely populated part of town with relatively few cardholders, which indicates that while the library should continue to focus on welcoming new cardholders, it should devote more resources towards reaching out to potentially lapsed cardholders and promoting our wide variety of services beyond our collection.

Regarding age, the understandings gained from the map mirrored other statistical insights (social media, surveys) and confirmed our intuition that older populations are more likely to use the library to

check out materials. There was a direct relationship between median age, percentage of residents that have a library card, and the percentage of active cardholders by census tract. Accordingly, we are currently developing a formalized strategy focused on library services for Harrison's over-50 population.

LIMITATIONS AND REFLECTIONS

The heatmap's primary limitation is that it includes data relating to only a subset of Harrison Public Library users: cardholders. Numerous groups make up our users, including cardholders, non-cardholders, library visitors, and those who use online resources such as our website. There is substantial overlap between these groups. For example, some library visitors attend movies, talks, and other programs (which they may have heard about on our website),

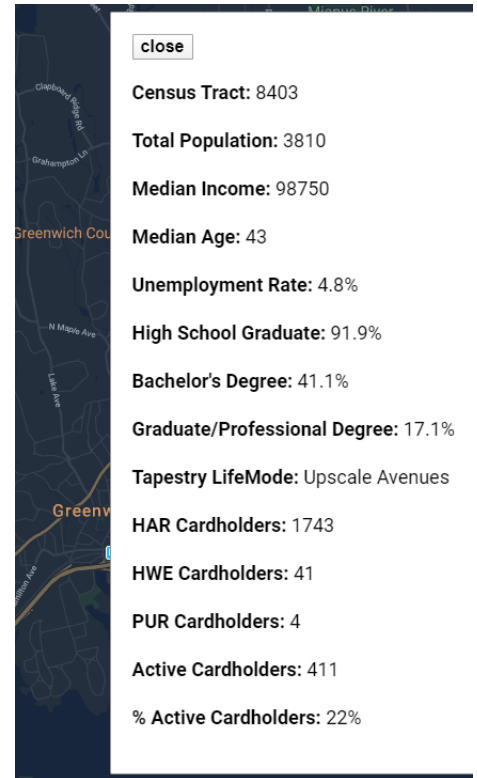


Figure 11. Metrics displayed for a selected downtown Harrison census tract.

and check out materials, while others visit only for the programs. Our integrated library system, Evergreen, provides us easy access to a cardholder database with information about where our cardholders reside, which we were able to use to build the heatmap. Though our cardholders make up a significant portion of our users, there are other users not captured by this analysis.

In addition, the data we used for the heatmap is imperfect. We have the date of a cardholder's most recent checkout within the past six months, but we don't know where the checkout occurred. It is possible that although the cardholder signed up for their card with the downtown library or West Harrison branch, they are now using a different library, as their card permits them to check out materials at any library in the county system. Finally, the census bureau notes that the "ACS, like any other sample survey, is subject to error"²², and as mentioned in the Conclusions section, analyzing simple measures of central tendency provides only a cursory glance at a population.

Furthermore, using Google for this project provided an opportunity to reflect on protecting patron privacy. We restricted access to the tool to only a few authorized staff members, hosted our data in a locally managed MySQL database, set up an SSL certificate to make sure we were sending

» Libraries have played a pivotal role in assisting with the 2020 census through promotional efforts, providing safe spaces to fill out the form, and numerous other initiatives.

requests encrypted, and did not submit any additional contextual data when using Google's Geocoding API. With these mitigations, we did not provide Google any information about these plots except that they are somehow all in a set. On reflection, however, this is a reminder that, as developers, we need to be mindful that we ultimately never know exactly how large companies might contextualize the data that they collect when we utilize their APIs.

If we were to do the project over, we would eliminate Google from the process. We would obtain coordinates using the census geocoder, accept the limited results, and use an open source platform, such as OpenLayers, to do the heatmap. In hindsight, perfect was the enemy of good, and we could have saved time, not had to enter any billing information (and risk being charged), and had the freedom to choose any platform we wanted to build the map since we would not have been bound to Google's stipulation prohibiting using Geocoding API data on a map that is not a Google map.

Finally, readers may have noticed a metric called 'Tapestry LifeMode' in the tooltip displayed in the previous image. This was added by assigning an Esri Tapestry Segmentation²³ to each census tract in Harrison in an effort to give each neighborhood a general classification. This project was an initial experiment in learning more about library users in our continuous effort to improve service. We look forward to building on what we have done.

HOW LIBRARIES CAN WORK WITH OPEN DATA

Libraries have played a pivotal role in assisting with the 2020 census through promotional efforts, providing safe spaces to fill out the form, and numerous other initiatives. The conclusion of the 2020 census, however, doesn't have to be the end of libraries' involvement with open data. Libraries can use public data from the census, related census bureau surveys (e.g., American Community Survey, American Housing Survey (AHS), Current Population Survey (CPS)), and other open data sources to serve communities in a variety of ways.

As we've shown, libraries can use census bureau data to study the local population and strategize to meet its potential needs. Our use of the heatmap, for example, showed us the connection between proximity to a library building and library card signup rate, the inverse relationship between household income and library card use (for median household income extremes by census tract in our town), and the direct relationship between age and library card use. Our most notable development as a result of the heatmap project has been developing a formalized strategy focused on library services for Harrison's over-50 population.

There are a number of organizations that support open data projects at libraries, such as Civic Switchboard, an Institute of Museum and Library Services supported effort that aims to "develop the capacity of academic and public libraries in civic data ecosystems"²⁴. In 2019, Civic Switchboard

awarded nine libraries with stipends ranging from \$3,000 to \$9,000 to work on open data projects with local governments and other organizations²⁵.

One recipient, the Robert L. Bogomolny Library at the University of Baltimore, used open data to complement and enhance the value of the existing collection. During a multi-week research project, students linked census data and other local open data to archival and special collections materials in an effort to contextualize materials and strengthen historical descriptions. For example, students took on projects such as linking employment data to historic photos of a job fair²⁶.

Libraries can also support local community initiatives by assisting with civic open data projects. Another Civic Switchboard stipend recipient, the Pioneer Library System in upstate New York's Ontario County, collaborated with the Substance Abuse Prevention Coalition (SAPC) of Ontario County to map out the local substance abuse data ecosystem (i.e., who has the data, what types of data they have). The library system then shared the map with law enforcement, local government, and community members in order to encourage data sharing²⁷. Relatedly, in 2015, under a Knight Foundation-funded initiative called "Open Data to Open Knowledge," Boston partnered with its public library to catalog the city's existing data into a user-friendly portal with the goal to make it clear that the data is public, with no restrictions to access²⁸. ■



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ABOUT THE AUTHORS: Greg Sohanchyk has worked at the Harrison Public Library in Harrison, New York in multiple capacities and is currently enrolled in the Master of Information program at Rutgers. He holds a B.A. in Statistics from Yale and is looking to work in the field of assessment and user experience librarianship.

Dan Briem is a library assistant at the Harrison Public Library. A self-taught programmer, he has led numerous technology initiatives at the library.

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An Examination of Seed Libraries across Two Academic Institutions

BY HOLLY M. DEAN AND JENNIFER A. MEZICK

INTRODUCTION

Seed libraries provide free access to open-pollinated seeds—usually fruits, vegetables, herbs, and flowers—as well as information resources. They can provide new and engaging outreach possibilities while facilitating healthy sustainable communities. Regardless of the type of institution or organization, seed libraries can facilitate food access and social and environmental sustainability, foster community, and open doors for new partnerships within the organization and the with broader community. While seed libraries may take many forms, the start-up process includes several overarching elements. The elements examined here include developing the seed library's purpose and goals; establishing partnerships; planning for materials; preparing the collection, including sorting and packaging seeds; housing, organizing, and maintaining the collection, including building and maintaining the collection; growing community participation; and tracking, assessing, and showing the value of seed libraries.

This article seeks to provide readers with the knowledge and tools to establish their own seed libraries, through the examination of the start-up process at two public higher education institutions in Knoxville, Tennessee, the third largest city in the state. Pellissippi State Community College (PSCC) is the largest community college in Tennessee with five campuses, four libraries, and approximately 11,000 students. The University of Tennessee, Knoxville (UT), is a land-grant institution and the flagship research institution in Tennessee with three libraries and approximately 29,000 students. UT's campus is located in the heart of Knoxville, extending west from the downtown business district. These institutions were selected for this study due to the first-hand knowledge of the authors, because there is a lack of scholarly literature available on academic



Figure 1. Repurposed Card Catalog, UT Seed Library

seed libraries, and because of the contrast provided by examining seed libraries at two public institutions of different size and with different missions within the same city. Additionally, these seed libraries demonstrate the potential for academic seed libraries to integrate into their campus communities to help further experiential education and food access.

LITERATURE REVIEW

Each seed library may have a slightly different mission related to the types of seeds provided, the audience, the loan policy, and their primary goal. However, mission statements reveal that several seed libraries seek to facilitate access to fresh foods within their community; an effort that helps to alleviate food-insecure individuals and areas. The mission of Richmond Grows (n.d.), a well-known seed library program, is to “increase the capacity of our community to feed itself wholesome food by being an accessible and free source of locally adapted plant seeds.” Seed libraries with the Depauville Free Library (n.d.), Washington State University Jefferson County (n.d.), and

the Hickory Flat Seed Library (University of Georgia, Extension Office, 2016) include “advance,” “increase,” or “strengthen” food security in their mission statements. Described in later pages, the mission statements of the two academic seed libraries under examination in this paper include the alleviation of food insecurity as a central part of their missions.

Several studies have determined that food insecurity among higher education students and staff is prevalent, which was a driving force in the integration and expansion of the PSCC and UT seed libraries. Martinez, Maynard, and Richie (2016) published results of a 2015 survey that revealed that 42% of students across all ten University of California campuses struggled with food insecurity, with 23% experiencing “low” food security and 19% “very low” food security. More impactful than this revelation is that over half of the students who reported struggling with food insecurity also reported that this was the first time they had experienced this struggle, showing the relationship of food insecurity to college life. The study also details how food insecurity

negatively impacts students' ability to study and learn. A recent study conducted by researchers at ten universities found that an average of 30.5% of students in the Southeast and Appalachian regions of the United States are food insecure (Hagedorn, R., et al. 2019). Other studies on this topic have been conducted at universities across the country, from Alaska to New York, revealing food insecurity rates from 21 to 59% (Chaparro, Zaghloul, Holck, & Dobbs, 2009; Freudenberg et al., 2011; Lindsley & King, 2014; Patton-López, López-Cevallos, Cancel-Tirado, & Vazquez, 2014). Internationally, similar surveys across Australia revealed food insecurity rates among students between 46% and 48% (Hughes, Serebryanikova, Donaldson, & Leveritt, 2011; Micevski, Thornton, & Brockington, 2014).

In addition to providing a route for greater access to fresh produce, seed libraries in higher education may also provide a necessary element of learning gardens that are used for experiential education and community engagement. Citing research from K-12 and higher education, Dean (2018) finds that garden-based course integration has the ability to teach students professional and community building skills, as well as increase students' understanding of food systems, food access issues, economic diversity, cultural awareness, and ecological and social justice issues. In "Breaking New Ground," Ingalls (2017) explains that seed libraries in academia can engage the community through workshops that provide hands-on skills and serve as a focus for facilitating conversations related to social justice, food production, and ecology.

While there is a growing body of scholarly work supporting the purpose of seed libraries, few provide an in-depth discussion on the process for starting a seed library. In *Audio Recorders to Zucchini Seeds*, Tanner and Goodman (2017) tackle the subject from the public library perspective, encouraging local gardening of heirloom seeds. They point to the Plant Patent Act of the 1930s as the catalyst that drove commercial engineering of seeds and the shift in "our dependence from small seed suppliers to large commercial seed" (p. 63), leading to the decline in seed diversity. The authors provide valuable information on how states may have regulatory laws preventing seed libraries from starting, such as in, Pennsylvania where, until 2015, seed libraries were classified as distributors and subject to performing germination tests. Tanner and



Figure 2. Compact Seed Library Cabinet: These thin cabinets can sit on top of a table or be mounted on a wall or on the end cap of a shelving unit. The front is made of plexiglass with the seed library logo engraved. The shelves are angled roughly 30 degrees to keep the seed packets upright. Small angled wood jigs provide additional support to the seed library packets and serve as a device to hold labels. (Supplies for these cabinets were donated by a local hardware store.) The cabinets measure roughly 24 inches in height, 20 inches wide, and 6.5 inches deep. Magnets secure the plexiglass door when the cabinet is not in use. Their elegant design draws attention and encourages users to explore the collection.

Goodman include information on housing and organizing the collection, facilitating checkout, building partnerships, and marketing, but only provide brief ideas for how these can be accomplished.

While Conner (2014) does not mention academic libraries as a place to house seeds, they provide examples of four seed libraries that have been initiated by college students and student organizations: the Carnegie Library of Pittsburgh-Main Seed Library, the Sylva Sprouts Seed Lending Library, the Toronto Seed Library, and the Demeter Seed Saving Project. Conner also addresses various issues relating to starting a seed library, such as funding, storing, packaging, marketing, and facilitating check out.

Peekhaus (2018) states that "the lack of in-depth research about seed libraries

is a significant lacuna in the academic literature that begs a response" (p. 272). Their study examines the start-up process by conducting interviews with ten public librarians to learn about the motivations and logistics behind creating a seed library. They determine that seed libraries align with public libraries' goal to engage and empower communities. Peekhaus suggests that there is a major gap in scholarly literature related to seed libraries, specifically within academic libraries. This article intends to fill that void by providing more detailed examples and discussions of the start-up process at two academic libraries, reflecting why certain decisions were made and how some of those decisions have evolved or have been changed.



Figure 3. Environmental Climatology Course at UT: The Environmental Climatology class participates in an experiential learning project at the campus urban garden, where they monitor soil temperatures throughout the semester using scientific equipment. The seeds for this project were provided by the UT Seed Library. Photo courtesy of Don Fike, Student Garden Manager at the University of Tennessee, Knoxville.

METHODOLOGY

Since the establishment of the PSCC Seed Library, we have presented at local and national conferences where audience questions revealed the strong desire to know how seed libraries are created and sustained, with regard to both larger organizational goals and basic operational logistics. To address these questions, we first analyzed our approach to establishing the PSCC Seed Library, and then examined how that process influenced the approach taken to start the UT Seed Library. Appendix A depicts a timeline of this three-year process, providing readers a visual of the process and methodology used. We examined key aspects of the start-up process of both

seed libraries including self-reflections and seed library usage statistics to develop best practices and guiding principles for other organizations wishing to start a seed library. Different approaches taken to start these two seed libraries are described in the sections that follow, along with our analyses of how lessons learned can best be applied to other seed library start-ups.

ESTABLISHING PURPOSE AND GOALS

The underlying goals for establishing a seed library are generally the same regardless of the type of institution or service community: to provide free access to open-pollinated seeds and information resources. When starting a seed library, it is beneficial

to establish the purpose and goals at the project's outset. Doing so can provide a clear direction for creating the collection and program, and inform funding and other support opportunities. Additionally, drafting a strategic plan/prospectus can help shape the purpose and goals, and provide a path on which to meet those goals.

Two different methods were used to establish the seed libraries at PSCC and UT. At PSCC, we began building the seed collection and allowed it to grow as opportunities within presented themselves. Two years later, the UT Seed Library was established by Dean along with another UT librarian. Taking lessons learned from the start-up process at PSCC and incorporating conversations with administrators and faculty at UT, Dean drafted a prospectus (as described below under "Overview of the UT Seed Library") and a literature review to help guide the program by outlining goals and to help solicit support by providing talking points to use with key stakeholders. This was important for the success of the UT Seed Library because of the significantly larger size of the institution, and the culture in which new initiatives are typically supported. Furthermore, this more formal approach enabled the program to be developed strategically since the greater potential for seed libraries had been realized.

As with any collection or program, several factors are key to establishing the purpose and goals of a seed library. Throughout the examination of the start-up processes, we asked several questions (Appendix B), which may be useful for others looking to strategically and efficiently establish a seed library. For both the PSCC and UT seed libraries, encouraging and empowering people to lead healthy sustainable lifestyles (socially and environmentally) were at the forefront of our purpose in establishing these initiatives. After connecting with campus partners and understanding our community a bit better, food access became an important component.

OVERVIEW OF THE PSCC SEED LIBRARY

PSCC is an open-enrollment two-year-degree-granting institution. Between 2015 and 2017, the largest population of students fell in the nineteen to twenty-three-year-old age range, with the average population age hovering around twenty-three (Pellissippi State Community College, Institutional Effectiveness, Assessment and Planning [PSCC, IEAP], 2020). Roughly, 20%

of the student population consists of first-time freshmen, and over fifty percent of the student body are first-generation students (PSCC, IEAP, 2020). The mission of PSCC is to provide “a transformative environment fostering the academic, social, economic, and cultural enrichment of the individual and the community” (PSCC, 2020).

The PSCC Seed Library works to support the College’s mission by providing enriching and engaging opportunities for campus community members to participate in campus events and volunteer opportunities that enhance knowledge of local needs and resources while empowering users to lead healthy, sustainable lifestyles. The PSCC Seed Library partners with the Hardin Valley Campus Garden, located at the largest PSCC campus, as well as the office of Service- Learning and Civic Engagement, the College food pantry, and faculty across disciplines to create opportunities for experiential learning and societal engagement. While the urban PSCC campuses can more directly address food insecurity, the Hardin Valley campus has greater labor to develop and facilitate such programs. Through its efforts, the Seed Library is able to support academic, social, economic, and cultural enrichment of the PSCC community. As the PSCC Seed Library has grown, so have its purpose and goals.

OVERVIEW OF THE UT SEED LIBRARY

UT is a competitive-admissions institution and the largest four-year and post-graduate degree-granting institution in Tennessee. It is located in an urban area adjacent to the heart of downtown Knoxville. Between 2013 and 2017, the average age of first-time freshmen was eighteen, placing the average student in the enrollment-age category of “traditional” (University of Tennessee, Knoxville [UT], Office of Institutional Research and Assessment, 2018, p. 10). One-quarter of UT’s undergraduate population consists of first-generation students (UT, Division of Student Success, 2018), and the largest population of transfer students come from PSCC (Tennessee Higher Education Commission, 2017, p. 38). As such, the relationship between the two schools has contributed to our strategic aligning of the mission statements of the PSCC and UT seed libraries (Appendix C), allowing us to pursue shared goals and purposes and to foster a wider community of engaged students and citizens.



Figure 4. FYS Gardening for Life Course at UT: In the FYS Gardening for Life course, students helped sort seeds in preparation for the grand opening of the UT Seed Library, while learning about the mission of the seed library initiative and ways to get involved.

The goals of the UT Seed Library are to engage students in experiential learning; foster community through connections to peers, faculty, and topics across disciplines; and increase awareness and understanding of global issues such as food access/insecurity and other social justice issues, biodiversity, food pathways, and environmental sustainability.

To meet the goals of the UT Seed Library, a prospectus was drafted to help guide the establishment of the collection and program. This formal approach was taken due to the larger size of the institution and because a greater potential for academic seed libraries had been realized with the PSCC Seed Library. The prospectus states the Seed Library’s mission and vision, the core values of the program, the program outcomes, the service community, the budget for starting and maintaining the collection, and workshops and other programmatic needs. This document provides milestones for the first three years of the start-up process, includes potential project/research ideas, and acknowledges communication and marketing needs.

Additionally, the prospectus identifies

program leaders and partners, as well as potential partners on campus and within the community. This living document enables us to envision the scope of the UT Seed Library, provides a path for the development of the program, helps to facilitate conversations with potential partners, and furnishes evidence to administrators and stakeholders of the impact that the seed library can have on the institution and community.

ESTABLISHING PARTNERS

At PSCC, it all started with a single conversation. The idea of starting a seed library first arose during a casual discussion between Dean and an English instructor who spoke of an initiative to start a campus garden. After the Director of Library Services gave permission to proceed, we reached out to the faculty member responsible for the campus garden initiative to explore how our programs might align. We were then introduced to the campus garden manager and related campus initiatives, such as the campus food pantry, which further strengthened the partnership between our programs. Partnerships deepened when we applied for a small grant from the PSCC

Figure 5. A Portion of the PSCC Seed Library Checkout Form, Created Using SpringShare's LibInsight Program.

Office of Sustainability to purchase supplies. Through this effort, we connected with the office of Service-Learning and Civic Engagement, which opened doors for student involvement and experiential learning through class integration. This partnership also led to funding for events, such as seed-sorting parties and seed-starting activities. In turn, these events brought awareness of related campus resources and volunteer opportunities, and ultimately fortified students' use of the Seed Library collection.

Identifying and establishing partners for a seed library are important for growth and program success, and partners will be different at every organization. As we learned, potential partners can emerge from many contexts when the goals of the seed library, the service community, and key stakeholders hold precedence. Related initiatives can supply natural partners and stakeholders for the seed library and help strengthen all programs involved. Forming these partnerships during the start-up process revealed areas of potential impact and growth, and helped guide the direction of both seed libraries.

Based on the experience detailed above, it has proven beneficial to develop a condensed version of the initiative (Appendices D, 1–2) that can be easily shared during a quick conversation, to describe how the seed library can support other programs, initiatives, and departmental goals—this tool has enabled us to avoid making partnerships in name only. Additionally, we learned that seeking out organization and community events related to the seed libraries' mission provides networking opportunities and increases personal knowledge of other programs and initiatives. Events and networking opportunities have included tabling

at Earth Day and employee wellness events, taking part in sustainability initiatives, attending or participating in community seed swaps, and serving on advisory boards for campus gardens. As a result of these events and others, we connected with faculty, staff, and community members involved in initiatives that complemented the Seed Library, such as a teaching garden at an elementary school several blocks from one of the PSCC campuses. Applying for campus funding and attending campus meetings further created opportunities to combine or collaboratively support new initiatives.

With PSCC campuses spread out geographically and UT being a large institution, communication among departments can be complicated; however, hosting meetings for potential partners removed these large institutional barriers. We used these opportunities to discuss the seed libraries' vision and to gather ideas that would help the Seed Library meet established goals. Disseminating information about the seed library also opened doors for potential partnerships. Additionally, we discovered the importance of being open minded, as these discussions may reveal opportunities to adjust the vision and better serve the needs of our community. For example, the initial goal of the PSCC Seed Library focused on encouraging gardening, but after meeting with the Hardin Valley Campus Garden manager, the need to help facilitate food access was discovered, as was the need to expand the users beyond PSCC affiliates.

PLANNING FOR MATERIALS

Grants and Donations

A seed library consists of three components: seeds, seed storage envelopes or bags, and a

container to display, organize, and store the seed library collection. In creating the PSCC Seed Library, we first solicited seed donations from select seed companies and the local community, an effort that turned out to be surprisingly painless. Knoxville, Tennessee, is a vibrant city with a robust network of residents who promote gardening and related activities. Following seed-swaps hosted by a range of organizations, remaining seeds were donated for the creation of the PSCC Seed Library. A generous donation of seeds was also received from an heirloom seed company because the mission of the Seed Library benefits community food support programs. These donations allowed for a well-rounded collection.

The initial grant and donation awarded to the PSCC Seed Library, which totaled around \$200 for supplies and about 150 seed packets, specified that the collection was for students, staff, and faculty, which meant that we were not able to lend seeds to community borrowers until initial donations from seed companies had cycled out of the collection. Lesson learned: potential patrons and donors should be thoroughly vetted before being solicited for donations. Some companies or organizations may be disinclined to donate to libraries providing seeds to community users because they may lose business by donating seeds to the same people who would otherwise purchase them. Limiting patrons can, however, put a library in the situation where we found ourselves at PSCC, with generous donations coming in from the community but community users being denied the ability to use the seed collection.

Selecting Seeds

Initially, we accepted any seeds donated and selected a large variety of seeds to provide our users with options. As the PSCC Seed Library began expanding, and when starting the UT Seed Library, we drew from lessons learned during the set-up process and from usage statistics as described in coming pages. We reflected critically about several factors, including the gardening zone our institutions are located in, the drawbacks of using genetically modified (GM) seeds, and the total variety of seeds to select for each seed type. Knowing which seeds grow relatively well in each climate enables seed libraries to seek out seeds with a high chance of succeeding in that gardening zone. The USDA Plant Hardiness Zone Map of the Agricultural Research Service of the

United States Department of Agriculture (USDA, 2012) is a useful tool to use for selecting seeds and supplying other information to users.

Through our research, we learned that GM seeds are not recommended, as plants grown from these may produce sterile seeds that may not reproduce the following season. Also, some GM seeds are patented, meaning that it is illegal to replant from their harvested seeds (Conner, 2014, p.10). Both issues are especially important as the mission of our seed libraries includes self-sustainability and environmental sustainability. Sterile seeds work against these objectives. Clearly, if the goal is to create a specific collection, such as native plant seeds or pollinator seeds, then that goal will drive the type of seeds sought.

When selecting vegetable varieties for the PSCC and UT seed libraries, we learned to limit the overall number of different varieties of each vegetable type. This technique enables us to increase the number of seed packets for each variety while reducing the effort and time spent selecting and sorting seeds for the collection.

Limiting the variety of each type of seed also reduces the overall maintenance of these collections by reducing the likelihood of running out of a particular variety and therefore the need to remove labels from inside the catalog or to update the inventory. We thus streamlined our process for preparing seed packets for the collection.

PREPARING THE COLLECTION

At PSCC, seeds are repackaged to allow borrowers to grow three or four plants from one package. The exact amount of seed per package depends on the type of seed, for which instructions can readily be found online and on commercial seed packaging. The UT Seed Library's website provides additional information on planting and growing each type/variety of seed in the collection (UT, University Libraries, 2018). When repackaging seeds, we considered the number of plants anticipated to be grown per user, as well as the dimensions of the new seed packets—both the PSCC and UT seed libraries are using Kraft-paper coin envelopes measuring 2¼ x 3½ inches.

Before starting the PSCC Seed Library, we consulted with an urban public library in Middle Tennessee that had recently created a seed library. One of the biggest takeaways from that conversation was that sorting seeds into packages for the seed library is

Thank you for using the UTK Seed Library! Please fill out this form to checkout your seed packets.

You are (required)
Make a selection

You are borrowing seeds for (required)
Make a selection

What type of seeds are you borrowing? Please select all that apply. (required)

<input type="checkbox"/> Beans	<input type="checkbox"/> Kale	<input type="checkbox"/> Spinach
<input type="checkbox"/> Broccoli	<input type="checkbox"/> Lettuce	<input type="checkbox"/> Squash
<input type="checkbox"/> Carrots	<input type="checkbox"/> Onions	<input type="checkbox"/> Tomatoes
<input type="checkbox"/> Cucumbers	<input type="checkbox"/> Peas	<input type="checkbox"/> Watermelon
<input type="checkbox"/> Flowers	<input type="checkbox"/> Peppers	
<input type="checkbox"/> Herbs	<input type="checkbox"/> Radishes	

If you selected:

beans, what variety?
 Blue Lake Bush Cherokee Trail of Tears Mountaineer Half Runner Purple Teepee Roma II Bush

carrots, what variety?
 Cosmic Purple Danvers 126 Half Long Nantes Scarlet

cucumbers, what variety?

Figure 6. A Portion of the UT Seed Library Checkout Form, Created Using SpringShare's LibWizard Program.

extremely time-consuming. In this case, one public librarian had dedicated many hours at home to sorting seeds for their collection. Had this responsibility been left to us, the PSCC Seed Library would have failed.

Fortunately, many PSCC students need volunteer hours as part of the state's

Tennessee Promise scholarship requirements. All that was needed was a way to alert students to the opportunities to meet their service requirement. From this need emerged the idea of seed-sorting parties. While this public seed library did not necessarily provide a good model for starting an academic seed library, it did enable us to realize some complexities of starting a new collection that we had not initially considered.

During the fall semester before the PSCC Seed Library was scheduled to open, the office of Service-Learning and Civic Engagement provided the Seed Library with \$100 to purchase snacks for seed-sorting parties that would help draw student participation. Student Life advised on peak times and days for student participation in activities outside the classroom. As a result, three parties, aligned with class times, were scheduled throughout that fall semester and marketed through flyers and blasts to student and employee listservs. At the first seed-sorting party, attendance included mostly employees and one or two students. By the beginning of the second year, seed-sorting parties had attracted more students than the room that was being used could accommodate. Everyone had to be very quickly relocated to a larger area.

Seed-sorting parties have continued each fall semester in preparation for the spring planting season. At PSCC, special guests are invited to each hour-long party to

provide information and promote awareness in an informal conversational setting about resources and services related to seed libraries. Guests have included representatives from nonprofit community farms and for-profit family-run farms; researchers and garden managers from the University of Tennessee Institute of Agriculture; and community members involved with local and national nonprofits that save seeds for native or heirloom plants. During the seed-sorting parties at PSCC, participants and organizers sat around one large table, family-dinner style. We provided instructions and everyone started sorting. Introductions were made around the table and, if necessary, we would kick-start the conversation by asking the guest to speak about their research, job, or organization. At these events, students became quite engaged and the conversations flowed naturally. Staff and faculty often joined the parties, allowing for additional campus networking. In addition to building the collection, these parties provided an informal experiential learning opportunity. Often, students returned on their own time to continue sorting seeds. Some needed more volunteer hours, while others wished to complete service-learning projects related to the Seed Library. By advertising these parties on student listservs, we also heard from students who were interested in sorting seeds but unable to attend the scheduled parties. Following this show of interest, we created a sign-in sheet and an area for students to sort seeds on a schedule that worked for librarians and students alike.

Several lessons were learned from the experience of putting together and hosting seed-sorting parties. During the first few

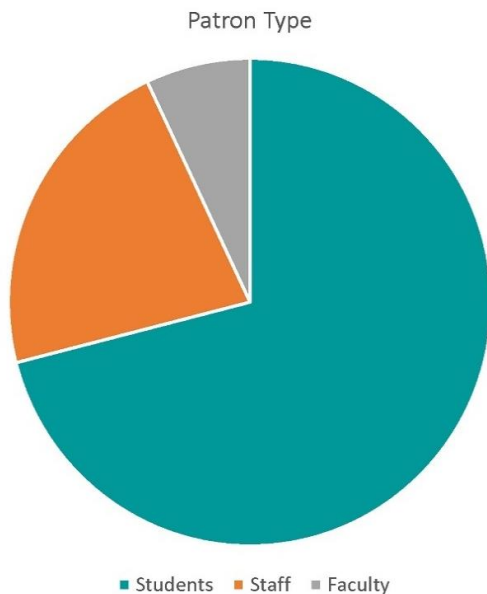


Figure 7. Usage of PSCC Seed library (Spring 2017): First semester data (spring 2017) from the PSCC Seed Library. The chart shows that 71% of collection users were students, 22% were staff, and 7% were faculty.

parties, a spreadsheet was on hand listing the quantity of seeds that should go into each Kraft envelope. The spreadsheet created confusion among students: we were constantly helping students with the sheet and interrupting discussions. Writing on the original seed packet or bag the number of seeds to place in each new envelope streamlined the process and allowed more active participation in discussions. A written example of how to label the Kraft envelopes also proved insufficient; we discovered that students benefited from having examples of Kraft envelopes and their seeds on the table in front of them.

These examples have the Kraft envelopes labeled horizontally and provide a physical sample that participants can touch to gauge how full certain Kraft envelopes feel. Lastly, before each party, we prepared tables with seed packets and bags, boxes of Kraft envelopes, pens, scissors, tape, and bead trays. During the first party, enough scissors and tape were placed on the table for students to share among three or four people; however, this arrangement created too much reaching for and passing of supplies. Going forward, we placed one set of each of these for every two participants, creating a better workspace.

For the UT Seed Library, pre-typed labels and stations in groups of two or more at different tables yielded the most effective way to sort seeds. Each group had one to two stations for sorting seeds into the labeled envelopes, a station for sealing the envelopes, and a third for attaching the pre-typed labels. With this method, some

groups chose to divide volunteers across stations, while other groups chose to do each step from start to finish. The UT seed packets were sealed using UT Libraries-branded stickers rather than tape—a way to further advertise the collection.

Volunteers at the UT seed-sorting parties consisted primarily of library employees, who found participating in these events very therapeutic. The decision to focus on library employees was due in part to staff and faculty desires to be involved in the process, to learn more about the initiative, and to take a break from daily work. In fall 2018, we also hosted one course-specific seed-sorting party. Both approaches to seed-sorting parties have proven to be effective for preparing the seed collections, building awareness of the initiatives, and creating community ownership of the collections.

HOUSING THE COLLECTION

At PSCC, we had access to decommissioned card catalogs, which, we discovered, make excellent seed library cabinets as they provide the dark, dry environment needed for proper seed storage, and with the rods removed, the cabinet drawers were the perfect size for organizing and housing the Kraft envelopes described above. They were also a cost-effective furniture solution for creating the new collection. This storage method was also adopted for the UT Seed Library, which similarly had access to a decommissioned card catalog (Figure 1). In addition to the convenience, cost, and storage effectiveness of the card catalogs, we realized that repurposing of old card catalogs

in the library brings joy and engages many who see it.

Cabinets for storing and displaying a seed library collection may vary however, depending on the space, resources, and desires of the library, as discovered when expanding the PSCC Seed Library to three of the campus locations. Two of these locations cannot accommodate a large card catalog. After researching options, we worked with a member of the theater faculty to fabricate a compact seed library cabinet, as shown in Figure 2.

For libraries with limited space or no permanent location, a mobile seed library can be a useful solution. PSCC has a fifth campus that is currently without a full-service library. To serve patrons at this campus, we provide a mobile seed library that is displayed when a librarian visits for weekly reference shifts. The collection for this mobile library includes a small selection of seed types and varieties representative of the larger collection, as well as handouts such as informational bookmarks, and an iPad for accessing the seed library's online resources. Since expanding the PSCC Seed Library to all of PSCC's campus locations, interest in the program greatly increased.

ORGANIZING THE COLLECTION

The focus of the PSCC and UT seed libraries is to provide patrons with seeds to grow food, so there are far fewer flower and herb seeds than vegetable seeds available. For this reason, flowers and herbs are grouped together in the card catalog, whereas the bulk of the collections are organized alphabetically by type (e.g., beans, corn, eggplant, flower, greens, herb, lettuce, etc.). Within each type—for example, lettuce—each variety is further organized alphabetically (e.g., Amish deer tongue, baby oakleaf, buttercrunch, iceberg, little gem, etc.). The separation of herbs and flowers has allowed patrons to find them more easily in the large cabinet. In the seed library cabinets fabricated for PSCC's smaller campus libraries, flowers and herbs are alphabetized by their actual type and interfiled with the other seeds (e.g., basil, beans, corn, dill, greens, lettuce, nasturtium, pansy, etc.).

When organizing the smaller cabinets, a bit of finesse was required to find the right combination of seeds that could be stored alphabetically while still providing a varied sampling of the larger collection. Variations in the thickness of the seed envelopes also played a role in how we chose to organize

Seed Packets per Campus Enrollment

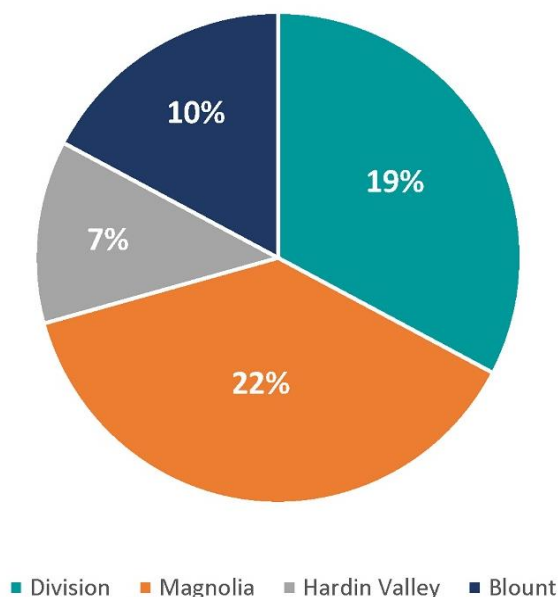


Figure 8, *Seed Packets Checked Out Per Capita, Spring 2018*: Seed packets checked out per capita for each PSCC campus, Spring 2018. Magnolia Avenue and Division Street campuses show the highest number of seed packets checked out per campus enrollment; these two campuses are located in food deserts within Knoxville, Tennessee.

them. For example, the size of bean seeds compared to tomato seeds means that the bean envelopes are much thicker. One variety of beans ends up occupying a single row while several varieties of tomatoes can be placed on one row.

Since sustainability is a focus, seed saving is promoted through all of the PSCC Seed Library displays, even in the labeling of the card-catalog drawers and inside the boxes. Labels are outlined in green, yellow, or red to indicate the level of difficulty in saving the seeds of each type (beginner, intermediate, advanced), and corresponding instructional information about saving seeds is provided on bookmark-sized handouts for quick reference. Other materials on display include concise information about how the Seed Library works, lists of related seed and garden books, and notifications of upcoming gardening workshops or seed sorting parties. A more comprehensive reference resource with planting guides, how-to articles and videos, and more detailed information about saving seeds is available online (PSCC, Libraries, n.d.).

While it is somewhat common practice to label seeds as beginner, intermediate, or advanced to indicate the difficulty of seed-saving for each plant, we found that this method confused some seed library users and deterred inexperienced gardeners from borrowing certain seeds from the collection.

Aware of this potential issue, a new organization structure was devised at UT to label card-catalog dividers with icons that indicate planting season(s)—a green leaf, a sun, an orange leaf, and a snowflake. As sustainability is a priority for the UT Seed Library, the Library has a comprehensive online resource for reference, providing detailed information about the seeds in the collection, organic gardening and seed-saving practices, among other related information (UT, University Libraries, 2018). Regardless of collection organization, online information guides can be valuable resources for all gardeners and seed library users and are also valuable open-access resources for community members.

BUILDING AND MAINTAINING THE COLLECTION

Some seed libraries encourage their users to harvest and return seeds to the collection, enabling a self-sustaining collection, while others encourage their community to harvest and save seeds for their personal gardening purposes rather than borrowing from the seed library each planting season. As an example, the Hillsborough Community College (n.d.) Seed Library encourages users to return seeds to the collection. In contrast, a seed library at the University of Arizona in Tucson does not accept seed returns but encourages users to donate

seeds to the local public library (University of Arizona, University Libraries, n.d.). Knowing that the percentage of returned seeds is often insignificant, we had to decide what would work best for our seed libraries. In an effort to create some level of sustainability, users of the PSCC Seed Library are encouraged to return seeds, mainly as an incentive to get people thinking about the seed-saving process but not as a method for replenishing the Seed Library supply.

In its first year, the PSCC Seed Library received one returned pack of seeds from a student who had checked out the seeds the season before, grown them, harvested the new seeds, and returned them to the Library in their original packaging.

Ideally, every patron who borrows seeds would return freshly harvested seeds. However, this being an unrealistic expectation in most situations, the PSCC Seed Library continuously seeks donations. PSCC's Sustainable Campus Initiative provided money to purchase additional seeds in 2018. Drawing from the experience of starting the seed library at PSCC, Dean decided to encourage UT Seed Library users to harvest and save seeds for their personal use the next planting season rather than returning them to the collection in an effort to create sustainable communities.

For seed libraries that encourage users to return seeds to the collection, there is an additional level of risk associated with returned seeds, namely their unknown vitality and trueness (i.e., the likelihood that the returned seeds will produce the same type of plant as the parent seed). Returned seeds can be tested for germination and trueness; however, this process may be costly and time-consuming. Depending on how many seeds of each type and variety are returned, there may not be enough seeds to obtain this information while also returning seeds to the collection. Additionally, returned seeds have to be relabeled with current date information. As an alternative, seed libraries can host community seed swaps.

While these events do not bring seeds back to the seed library collection, they do encourage local sharing and sustainability.

As the collection grows and ages, it will be important to deaccession expired seeds. The length of time seeds can be kept depends on the type and storage conditions. As for all perishables, a cool, dry place is optimal storage for seeds. At PSCC, the aim is to complete an inventory of seeds remaining in the cabinets and weed out

aged seeds during the winter months, in preparation for each spring planting season. The inventory provides a snapshot of what remains in the collection and where any gaps exist. The same model will be followed as the UT Seed Library ages. In addition to inventory and weeding, the cabinets need periodic rearrangement. This task can be done by a student worker or library volunteer assigned to straighten seed packets and refill any drawers or shelves that are sparse. Oversight has been critical to ensuring that maintenance is completed.

GROWING COMMUNITY PARTICIPATION

The PSCC and UT seed libraries were aligned with institutional missions and related campus initiatives and programs, links which enabled the collections to grow and develop naturally over time. We considered the possible need for food access across our campuses and the desire to garden among faculty, staff, and students. We also considered what roles community members could have and how the collections integrate into greater initiatives at the respective institutions— including potential for course integration. We hoped that involving the community during the development and expansion processes would increase interest and create a feeling of ownership. Regardless of the initial intentions for the seed library initiative, maintaining flexibility, regularly examining goals, and gathering feedback from stakeholders and potential users enables the seed libraries to grow sustainably and best align with the needs and desires of the user communities.

Promoting the Collection

While seed libraries may seem to be a familiar and easily understood phenomenon, we have discovered the importance of explaining what a seed library is, before delving into their unique components and providing context for seed libraries in society and in our organizations' service communities. Showing the value of the collection and program to the community has been critical to promoting the collection. Since food access is part of the missions of the PSCC and UT seed libraries, we actively researched food insecurity in higher education and used the data found to help show the need for seed library programs at both organizations.

Collaborating with organization and community partners has been a productive and efficient way to spread interest and promote the PSCC and UT seed libraries by word of

mouth. Partnering with the campus gardens and other sustainability programs at each institution effectively promoted the seed libraries and other community resources while facilitating the success of all initiatives involved. At PSCC, we partnered with the Hardin Valley Campus Garden, established at the same time as the seed library, creating simultaneous opportunities for community involvement and program expansion. At UT, the seed library is being established at the same time as the Grow Lab, a campus urban garden. As with PSCC, this opportunity to partner with related programs and initiatives on campus has naturally facilitated the promotion of the seed library and opened doors for program collaboration, student involvement, and greater community impact. Because of these partnerships, the UT and PSCC seed libraries have seen integration into courses across the curricula, from English Composition to Geographic Information Systems (GIS).

At PSCC, monthly emails proved to be an effective way to remind the community about the program while also encouraging use of the collection. The PSCC Seed Library opened in the month of January, allowing for timely transition into the local gardening season, which starts in February for those planting from seed. The PSCC Seed Library began sending monthly emails in February, offering tips on starting seeds and highlighting early-season growers such as kale, lettuce, peas, radishes, and spinach. Tracking with the growing season, we used the month of March to share information with PSCC users on transplanting their seed starts, as well as on what seeds to start next. Established campus (employee and student) listservs are used to promote the collection and information resources. At UT, there has been increased interest from the community in seed library events and opportunities to help out. Due to the large size of the institutions, it may prove more effective to start a listserv specific to the seed library rather than attempting to communicate through multiple campus listservs. A challenge with this method, however, will be to promote awareness of the new listserv.

Additionally, working with the PSCC and UT marketing departments and other campus departments has been an effective way to advertise events and promote seed library initiatives. At PSCC, the Seed Library partnered with Student Life— the non-academic student support service—to

include seed library events and promotional information in their monthly calendar flyers, posted throughout campus. At the grand opening of the UT Seed Library, the Library's marketing department created short videos for their social media sites (Twitter and Facebook) on the day of the event, as well as displaying posters in the entrance of the main campus library, a high traffic area. These promotions combined with word-of-mouth advertising drew over 200 participants to the grand opening event, mainly students who came to plant a seed that they could take home with them while learning about the seed library initiative. Students were ecstatic about the opportunity to learn to garden or to continue gardening, interests which they thought they had to leave behind when they came to college. Immediately following the grand opening, over 80 individuals checked out seeds from the collection. The success of the event showed us the strong desire for the program and created additional interest in further embedding the Seed Library into the community. It also generated further support from the library administration to host workshops and other related events.

Workshops

Workshops that cover a variety of gardening topics and methods were a natural expansion for the PSCC and UT seed libraries. Partnering with the campus gardens and local experts helped to facilitate workshops that contribute to the sharing of local knowledge, enrich community engagement, and bring awareness of organization and community resources. At PSCC, we began hosting workshops in the summer of 2017 at the College's largest campus in collaboration with the campus garden. Seed Library data indicated a potential need for the Seed Library to host gardening workshops at all campuses; the workshops were later implemented.

Workshops facilitated by the seed library can also be integrated into courses for a variety of disciplines. In fall 2017, Mezick collaborated with a faculty member from the English department at PSCC, whose English Composition course was discussing topics related to food access. The campus garden manager coordinated a seed-winning workshop that was held outside the library during one of their class sessions. Dried sunflower heads and other end-of-season crops were supplied by the campus garden manager, who led the students in

removing the various seeds from their pods while discussing the importance of saving seeds and how such saving can promote sustainability and continued food access for gardeners. This class-specific workshop was wildly popular with participating students and with passersby who stopped to observe and take part. A campus or community garden space would also be a great location for hosting workshops.

During the 2018-19 academic year, Dean worked with a faculty member in the College of Agricultural Sciences and Natural Resources to integrate the Seed Library into three different courses. These included a special topics First-Year Studies (FYS) course called *Gardening for Life* and taught in both fall and spring; an upper-level undergraduate GIS/GPS course; and an upper-level undergraduate Soil Sciences course called *Environmental Climatology*. The Soil Sciences course focused on the effects of climate change on global agriculture. For this course, the professor reserved a plot at the newly created campus urban garden known as the Grow Lab. Dean provided students with a brief introduction to the seed library initiative and its mission and supplied seeds to plant in the class's garden plot. As shown in **Figure 3**, students mapped the garden bed using the square-foot gardening technique and embedded soil monitoring equipment throughout the plot to record changes in temperature during the growth season of the plants. This experiment supplied students with firsthand experience that they could apply to their global studies research in class.

Midway through the fall semester, the FYS course, *Gardening for Life*, which visits various campus and community resource sites pertinent to gardening and food access, participated in a seed-sorting party to benefit the UT Seed Library (**Figure 4**). During this class session, students learned about seed libraries, the mission of the UT Seed Library, and volunteer opportunities, while they helped to sort seeds in preparation for the grand opening of the UT Seed Library. Students were highly engaged during this class session and were eager to volunteer at future events hosted by the Seed Library. In the spring semester, the FYS *Gardening for Life* course once again coordinated with Dean, this time to help transplant pollinators into the Seed Library's garden plot.

In the spring semester, students in the 300-level GIS/GPS course learned how to

use GIS software in a real-world context through projects such as mapping the Knoxville, Tennessee, community which includes the UT and PSCC campuses.

Students identified food-desert locations and vulnerable population groups, potential sites for community gardens, and potential sites where the UT and PSCC seed libraries might host gardening workshops to help facilitate food access. The data gathered in this course can potentially become a part of the UT Seed Library collection for future use by other courses at either institution. Whether hosted independently or integrated into a course, workshops can be a valuable way to expand seed libraries and integrate them deeper into the community.

ASSESSING AND SHOWING THE VALUE OF THE PROGRAM

When establishing the PSCC Seed Library, we knew that assessment and showing the value of the Seed Library were going to be vital to our long-term success.

Knowing that tracking use of the collection would be of value to key stakeholders and to the guidance of the Seed Library's future, we created a statistical data-gathering system which took into consideration the overall vision of the Seed Library. Various methods for gathering usage statistics were considered and included how the data would be displayed and how easy it would be to read and/or compile. At PSCC, the Seed Library uses a SpringShare product (first LibAnalytics, then LibInsight) designed specifically for libraries. These products constitute the main statistical data-gathering system already in use at PSCC Libraries and thus provided a ready means of gathering seed library statistics without additional cost or personnel familiarization time.

When first setting up the usage form in LibAnalytics, PSCC included the following data points: patron type (student, staff, faculty); email (optional); and seed type, broken down alphabetically, with a separate category for herbs. Seed categories were set up as check boxes, allowing more than one option to be selected within each category. In the original LibAnalytics dataset, seed varieties were included; however, we quickly discovered that including them was a significantly more time-consuming way to keep the form up to date and tracked more information than was necessary. By including only broad seed types, we could satisfactorily track the type of seeds that were popular among the user population.

Annual inventory of the collection provided additional information about which varieties were most popular.

In the fall of 2018, PSCC migrated to LibInsight, Springshare's replacement platform for LibAnalytics. The new form, shown in Figure 5, includes campus location to allow analysis at the different campuses. And, rather than check boxes to track the type of vegetables borrowed, users now enter the total number of seed packets for each type of seed selected, thus reducing the time spent entering information into the form; previously, a new submission had to be entered for each seed packet of the same type taken by a single patron.

LibWizard, another SpringShare application that allows subscribers to conduct surveys, was used to create a check out form for the UT Seed Library. The form contains the following categories: patron type (student, staff, faculty); reason for borrowing seeds (personal use, a class project, a community project, other); and type of seeds being borrowed (check boxes). This section is followed by a breakdown of varieties within each type where more than one variety can be selected, as shown in Figure 6. Lastly, the form has an optional email text box for users who wish to participate in a user survey.

When selecting seeds for the UT seed collection, data from the PSCC Seed Library was used to determine which seed types were most popular among users. A small selection of varieties within each seed type were then chosen. At PSCC, users select their seeds from the collection and then bring them to the reference desk where a librarian completes the LibInsight form. At UT, users select their seed packets and then fill out the form themselves on an iPad adjacent to the card catalog containing the seed collection. Librarians are still available to answer user questions at the public services desk located directly adjacent to the Seed Library, but users do not have to wait in line to check out their seeds. When determining whether to use a self-checkout method or have users interact with staff, we considered the questions found in Appendix B. Answering these questions helped us determine the best method for tracking the UT Seed Library collection.

TURNING STATISTICS INTO ADVOCACY

Whatever program or software is used to track the seed library collection, the data gathered can reveal the value of the collection. When starting the PSCC Seed Library,

» **Like any new initiative, starting a seed library comes with lots of lessons learned and with transformations in purpose and direction as the program evolves and grows. A public librarian's first-hand experience was invaluable during the planning stages of the PSCC Seed Library. When starting the UT Seed Library, Dean relied heavily on lessons learned from the PSCC Seed Library.**

we assumed that staff and faculty would be our immediate primary users, and that we would need to develop a strategic plan for reaching out to students.

However, within the first semester that the PSCC Seed Library was open, it was clear that the students were naturally drawn to the collection. From the time the collection opened in January to the end of the first spring semester in May, the statistics gathering system recorded 109 transactions, of which 65% were with student users. When the Seed Library expanded to PSCC's three other campus locations, this trend continued, with student users increasing to 71% of the total user population, as shown in **Figure 7**.

The statistics gathering system also captured the total number of seed packets taken, which jumped from 323 in the first semester to 820 in the next academic year (with the majority occurring during the spring semester). This data was compared to campus enrollment totals to judge interest in the collection compared to headcount at each campus. While data shows good use at all campuses, the Magnolia Avenue and Division Street campuses, which are located in urban food desert locations (USDA, 2017), have shown the highest usage of the collection per capita (**Figure 8**). This data suggests that the PSCC Seed Library may be successfully connecting with its target user population and aligning with the goals pertaining to food access. Tracking the collection use can show the interest of such a program within our community. Additional research is needed to determine the real reasons patrons are using the Seed Library and if the service is alleviating access issues to fresh produce and supporting experiential learning initiatives.

It is the intention of the UT Seed Library to survey users who choose to provide their email addresses at checkout about their gardening experience and purpose for gardening. This data will provide informa-

tion on our user population and indicate potential needs for information as well as for additional outreach services. It is our hope that by collecting this type of qualitative data, we can provide a narrative to accompany quantitative data and use these stories to further guide and bring awareness of the seed library initiative.

CONCLUSION

Like any new initiative, starting a seed library comes with lots of lessons learned and with transformations in purpose and direction as the program evolves and grows. A public librarian's first-hand experience was invaluable during the planning stages of the PSCC Seed Library. When starting the UT Seed Library, Dean relied heavily on lessons learned from the PSCC Seed Library. Looking back on the two processes, limiting the number of seed varieties, as was done with the UT Seed Library, has been one of the most beneficial differences in the start-up processes of the two seed libraries. This may not be the right decision for every type of library, but at our academic institutions, this has made the Seed Library more manageable without affecting the mission of the program.

Additional knowledge can be gained on the impact of seed libraries on their communities through user surveys and interviews which can further inform the start-up process and identify a direction for new seed libraries. Understanding *where*, *how*, and *for what purpose* communities are using seed libraries can yield more in-depth understanding and further direction for established seed libraries to better serve their communities. At PSCC, it took almost a year to start the seed library, and at UT, it took a year and a half. The lengthy start-up time involved many meetings and a lot of networking to bring internal stakeholders on board.

Without the time dedicated to building community engagement and planning applications for the seed libraries, neither

would be sustainable. Establishing the community connections is, without a doubt, the most important step of the start-up process. Further research is needed to demonstrate the success of seed libraries within academic institutions and to illustrate the many ways in which seed libraries can be used for experiential education.

A concluding thought for academic seed libraries is that the term "seed library" has proven a difficult concept for outsiders to envision, making it hard to realize the full potential of these programs. This difficulty has, therefore, prompted discussion of how we can frame these crucial community services. For professionals involved in managing seed library programs, we need to adopt an all-encompassing name that all stakeholders and community members can understand and feel empowered to be a part of. This struggle is not a new notion to libraries, who battle the age-old thinking that libraries are merely about books. ■

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ABOUT THE AUTHORS: Holly M. Dean is an assistant professor and Student Success Librarian for Experiential Learning at the University of Tennessee, Knoxville. She holds a Master of Science in Library Science from Clarion University of Pennsylvania. Jennifer A. Mezick is an assistant professor and Collection Strategist at the University of Tennessee, Knoxville. She holds a Master of Science in Information Sciences from the University of Tennessee and a Master of Arts in Photographic Preservation and Collections Management from Ryerson University.

[References](#)
[Appendices](#)

Leadership, Development, and Expertise

» A Qualitative Content Analysis of Scholarly Communication Librarian Position Announcements

ANGELA HACKSTADT, SENIOR ASSISTANT LIBRARIAN, UNIVERSITY AT ALBANY, SUNY

INTRODUCTION

The scholarly communication (SC) librarian emerged as a new position in 2011 (Triumph & Beile, 2015, p. 735). Since then, the number of librarian positions that focus on SC responsibilities has increased, as well as the number of positions that refer directly to SC in the job title. In 2012, the Association of Research Libraries reported that 95% of libraries identified their libraries as leaders of scholarly communication efforts on campus. While academic librarians have long been responsible for SC issues, institutions have explicitly tasked positions with these responsibilities increasingly over time. By 2014, 11% of job postings at academic libraries contained a reference to SC (Finlay, Tsou, & Sugimoto, 2015, p. 18) and the number of jobs that refer to SC, digital or electronic resources, licensing, and repositories has steadily increased (Kawooya, Veverka, & Lipinski, 2015, p. 345).

The purpose of this study is to analyze the text of job advertisements for SC librarians posted on ALA JobList between January 2016 and July 2019 to identify common themes in the way hiring institutions describe the ideal SC librarian. This qualitative analysis of position announcements focuses on the ways libraries expect these librarians to engage with SC issues and responsibilities, rather than describing the prevalence of SC-related functions. It aims to raise questions about the library's first impression to applicants and set up future research to determine if there is a disconnect between the promise and the reality. Specifically, this study asks the following questions:



Q1: How do administrators communicate leadership expectations of SC librarian roles through job advertisements?

Q2: In what ways could these leadership expectations be challenging or problematic for SC librarians in non-administrator positions?

Focusing the study on positions that specify SC in the job title brings to the fore those libraries that stake some claim to SC leadership for their campuses. To answer the first question, this study examines the descriptions of the people that library administrators hope will do these jobs. Leadership, development, and expertise are referenced in lists of responsibilities and desired qualifications for SC librarians, all of which imply that these librarians will also have the authority to make decisions or implement changes at these institutions. The advertise-

ments describe an expectation to lead and effect change but do not necessarily say anything about the power to do so.

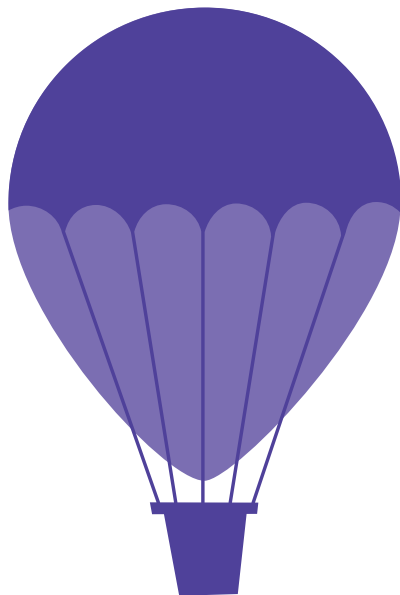
This study addresses the second questions in two ways. First, issues related to leadership and authority are discussed, as well as the importance of situating these open positions within their libraries. Second, this study briefly discusses the SC librarian as a boundary spanning role. Boundary roles, or boundary spanners, are positions that act as external representatives of an organization or as a filter for information coming into an organization (Aldrich & Herker, 1977, p. 218). This study expands on the currently limited discussion of boundary roles in the library literature by focusing on challenges that people serving in such roles may encounter with regard to leadership, development, and expertise.

LITERATURE REVIEW

Previous analyses of job advertisements demonstrate an increase in new and changing roles in librarianship as well as emerging organizational trends. Triumph and Beile (2015) compared 2011 job advertisements to previous studies to determine the overall state of the library job market. Studies of job advertisements also focus on specific roles, such as youth services librarians (Adkins, 2004); instructional design librarians (Shank, 2006); Latin American and Caribbean Studies librarians (Alonso-Regalado & Van Ullen, 2009); digital librarians (Choi & Rasmussen, 2009); instruction librarians (Gold & Grotti, 2013); head of technical services positions (Zhu, 2009); serials librarians (Getsay & Rudowsky, 2013); catalogers (Dieckman, 2018; Hall-Ellis, 2008); and copyright librarians (Kawooya et al., 2015). Such studies may also be skills-specific, as in digital curation (Kim et al., 2013) or metadata (Hall-Ellis, 2015); or they may be publication-specific, such as Wu and Li's study of reference librarian positions posted in *Journal of the Medical Library Association* (2008). Analyses of job announcements may also be bound by geography, as in a study of job postings by higher education institutions in United Arab Emirates (Kaba, 2017); an evaluation of job titles in Sindh Province, Pakistan (Mustafa & Ansari, 2012); or to review library information studies and information management curricula in Australia (Wise, Henninger, & Kennan, 2011).

Prior research has analyzed job announcements for SC positions in libraries. Finlay et al (2015) reviewed job postings in academic libraries to determine the prevalence of SC responsibilities and skills and to learn which positions include them. Xia and Li (2015) analyzed the qualifications and responsibilities of SC librarians to identify the trajectories of SC responsibilities in librarian positions. Kawooya et al studied advertisements for copyright librarian positions and noted a strong connection between these positions and SC (2015, p. 345).

SC issues impact researchers across the institution. Considering the skills and experience of librarians in curation, metadata, and preservation (Xia & Li, 2015, p. 20), the library is a natural fit for leading the way in meeting the SC needs of the campus. Indeed, libraries are already providing services that fall under the SC umbrella, such as research data management, copyright, and measuring research impact (Mears & Bandy, 2017, p. 147). SC efforts, whether



the responsibility of an individual or a team, depend upon collaboration between library departments (Radom, Feltner-Reichert, & Stringer-Stanback, 2012, p. 13; Xia & Li, 2015, p. 19).

Early research in boundary roles, or boundary spanning roles, focused on commercial research and development (Aldrich & Herker, 1977; Tushman, 1977) but the concept is applicable to any organization that requires communication with the external environment. In library literature, boundary spanning has been identified as a way to facilitate understanding between library units and other departments (Humphreys, 2018) and suggested as a model to facilitate communication between cultural domains to create a global digital public library (Mason, 2005, 2010). The literature in related fields of knowledge or information management and information technology focus on communication across boundaries in various professional settings (Han, Datta, Joshi, & Chi, 2017; Hustad & Bechina, 2012; Van Osch & Steinfeld, 2016; Weedman, 1992).

METHOD

Qualitative Content Analysis

Qualitative content analysis refers to the systematic analysis of texts, including the format of delivery. It seeks to describe categories and themes, though the method does allow for more interpretation than quantitative content analysis (Drisko & Maschi, 2015, pp. 86–88; Schreier, 2014, p. 181). In conducting qualitative content analysis, the researcher codes the chosen text using a coding framework developed in conjunction

with a reading of the text. This is often an iterative process, as new connections and themes emerge with subsequent readings (Krippendorff, 2013, p. 259; Schreier, 2014, p. 171; White & Marsh, 2006, p. 33). Schreier (2014) points out that while the method is systematic, it is “flexible in that the coding frame should always be matched to the material” (p. 171). Categories in the coding scheme consist of subcategories, identified through a data-driven way such as subsumption. The process of subsumption involves reading through the text and, upon encountering a relevant concept, either “subsuming” the concept under the appropriate subcategory or creating a new subcategory, then continuing the process until no new concepts can be found (Schreier 2014, p. 176).

NVivo was used to code the text. Job advertisements were first reviewed for job title and institution location. Next, responsibilities were coded as SC-related or administrative; qualifications were coded by degree requirements, then by desired SC-related skills and experience. The repetition of words and phrases related to leadership was perceived during these initial rounds of coding, so the search function of the software was utilized to search for “lead*” and synonyms. Subsequent readings of the text allowed for reviewing these words and phrases in context. The coding scheme further developed to incorporate statements about expertise and development.

As texts, position announcements vary in length and organization, as library staff who write them are subject to different institutional requirements and practices. Some libraries hire advertising agencies to post position announcements on employment sites on the library’s behalf. An ad agency can save the hiring institution time and money by streamlining the posting, troubleshooting, and billing processes (Gunning, 2019). NVivo allows for coding a large collection of the same, yet different, individual texts by identifying commonly used words and concepts and allowing the researcher to view those in context.

This study focuses on themes that overlap and repeat, often in a single position announcement. The purpose of qualitative content analysis is to raise “awareness and theoretical sensitivity but does not claim to demonstrate transferability” (Drisko & Maschi 2015, p. 98). The aim of this study is to assess the meaning and context of the concepts rather than quantify them.

DATA

Position announcements have been established as an appropriate subject of study. They are useful for assessing employers' expectations of roles and functions in the library (Wise et al., 2011, p. 269; Wu & Li, 2008, p. 378; Xia & Li, 2015, p. 17; Zhu, 2009, p. 124). Job advertisements can also help researchers understand the current state of library practices and identify trends (Alonso-Regalado & Van Ullen, 2009, p. 140; Xia & Li, 2015, p. 17).

The dataset is comprised of 100 position announcements for jobs in academic libraries posted between January 1, 2016 and July 31, 2019. ALA JobList provided all job advertisements yielded in a keyword search for "scholarly communication*" submitted during the relevant period. In the event an institution reposted a position with the same title within a 12-month period, the announcement appears only once in the dataset unless the institution made changes to the position's responsibilities or qualifications. For the purpose of this study, an advertisement must include a robust description of a position's responsibilities, qualifications, or both to be included.

LIMITATIONS

This study is limited in scope due to the source of data. Postings are from libraries that pay to advertise job openings in ALA JobList and are predominantly from the United States. Ninety-eight advertisements are from institutions in the U.S., one from Canada, and one from Hong Kong. The top U.S. states represented in the dataset are California, Pennsylvania, Florida, and Texas. The data used in this study does not include internal job postings or advertisements submitted to publications or listservs by special library or archives associations, print sources, or other sources of academic library jobs. This study also does not explore whether institutions filled these positions.

Position titles do not always reflect day-to-day responsibilities, so limiting the data to positions with the phrase "scholarly communication" in the job title may have excluded positions that perform a high degree of scholarly communication activities.

RESULTS

Job Titles

Nearly half of the job titles in the dataset refer only to SC, for example Scholarly Communication Librarian, Head of Scholarly Communication, Director of Scholarly

Table 1. Job Titles

JOB TITLE COMPONENTS	NUMBER OF POSTINGS*
Scholarly Communication (SC) only	48
SC & Collections	11
SC & Research	9
SC & Copyright or Licensing	6
SC & a specific academic subject	6
SC & Data	5
SC & Digital	4
SC & Reference	4
SC & Publishing	2
SC & Open Education Resources (OER)	2
SC & Instruction	2
SC &	4**

*Some job titles include more than one additional component, e.g. Associate Dean for Research, Collections and Scholarly Communications

** One instance of each: Access Services; Assessment; Electronic Resources; Systems

Communication, or Scholarly Communication Officer. The remaining job titles include an additional component that refers to a library department or some other duties of the position. (See Table 1: Job Titles)

These job titles demonstrate the breadth of SC-related functions and align with previously identified relationships between SC and collections (Finlay et al, 2015, p. 20), open access, digital publishing, and legal issues associated with research and publication (Xia & Li, 2015, p. 18). Literature on institutional repository (IR) workflows describe obtaining information about self-archiving rights or publishers' copyright policies as a significant responsibility of the IR team (Hazzard & Towery, 2017; Hanlon & Ramirez, 2011, p. 693; Madsen & Oleen, 2013). Six advertisements reviewed in this study listed a Juris Doctorate as a preferred qualification beyond an ALA-accredited MLS for SC librarian positions.

Only two positions designate Open Educational Resources (OER) in the job title but 20 job descriptions describe responsibilities for or desired qualifications in OER. The responsibilities range from promoting OER, to educating others in their use, to developing OER programs. There is also a relationship between copyright and OER in job descriptions. Two SC and copyright librarian positions specifically refer to OER while the others describe general research, publishing, and use issues.

COMMUNICATING LEADERSHIP RESPONSIBILITIES

The 2012 ARL SPEC Kit states that most of

the respondents to their survey claimed that their libraries were responsible for scholarly communication leadership efforts, but these leadership claims are qualified. Respondents mitigated statements with explanations that leadership duties span departments or by mentions of contributors from outside the library (Radom et al., 2012, pp. 11–12). This study demonstrates that the expectation of the library to lead SC efforts persists, with leadership responsibilities frequently appearing in advertisements for SC librarian positions. Leadership, development, and expertise are discussed individually but these themes often overlap in job descriptions.

This study explores two meanings of leadership. First, references to leading, guiding, or managing were reviewed for more nuanced meaning to determine what kind of leadership activity the advertisement describes. In some postings, these statements describe managerial or administrative functions such as leading a unit, program, or department. In other postings, "lead" has a broader meaning and suggests the incumbent will take some initiative or be an exemplar, but not necessarily a manager. Second, a distinction is made between administrator and non-administrator positions. Wong (2017) describes two categories of leadership present in libraries: assigned leadership, found at any level from leading a committee to mid-management to higher administrative positions, and emergent leadership, which are jobs held by those who have leadership responsibilities but do not have titled roles (p. 154). U.S.

institutions commonly use titles such as Dean, Associate Dean, or University Librarian to indicate a higher administrative position. Still other postings indicate a managerial role by referring to a position as a Director, Head, or Lead. In this study, roles with these titles are considered assigned leaders. Positions that do not indicate administrator or manager roles by title, or do not clearly define such in the job's duties, are considered non-administrator roles for this study. Where an advertisement makes statements of leadership responsibilities for non-administrators, these jobs align with Wong's emergent leadership.



efforts to raise awareness and educate the University on trends and issues in the areas of scholarly communication, open access, open education resources, copyright, and fair use.”

SC librarians are also responsible for leading outreach efforts within the library, for instance coordinating, educating, and training subject liaisons or other library staff on SC issues:

“Assume the leadership role...in coordinating and educating

liaisons and staff...” “...leads education and outreach to faculty and provides guidance to library colleagues and others on issues relevant to the evolving scholarly publishing landscape...”

MANAGEMENT

The literature demonstrates a trend in libraries to delegate SC responsibilities and leadership to administrative roles (Finlay et al., 2015, p. 19), such as mid-level administrators, assistant deans, or associate deans with additional responsibilities in budgeting and planning (Xia & Li, 2015, p. 18). The theme of leadership as a function of management appears in both administrator and non-administrator positions.

The inclusion of “scholarly communication*” in a job title does not necessarily indicate a high level of engagement with SC responsibilities (Finlay et al, 2015, p. 10). In the present dataset, assigned leadership positions with a strong focus on SC responsibilities tend to be mid-level management roles, such as manager, head, lead, or director. Mid-level management positions also tend to highlight a specific SC issue in the job title, such as data, copyright, or digital scholarship. The exception is a job description for an Access Services and Scholarly Communication Librarian. This position has management, hiring, and supervisory responsibilities and tasks the librarian with copyright-related duties.

Higher-level administrative jobs have fewer SC-specific tasks and are responsible for over-seeing a range of services and departments. These advertisements briefly refer to scholarly communication in relation to managing, leading, planning, or developing programs or initiatives.

Leading, in the sense of managing

people, is a common responsibility for upper- and mid-level administrator positions. However, the responsibility to manage a thing, such as a repository, could fall to non-administrator positions as well:

“[O]verseeing the management of [institutional repository].”

“The Librarian manages and develops [the institutional repository] ... and other scholarly digital content.”

“Manages the Libraries’ institutional repository.”

Institutional repository responsibilities appeared in positions with collections responsibilities, indicating that institutions were incorporating SC duties into positions that did not originally include them (Finlay et al, 2015, p. 20). Institutions now expect SC librarians to take on the role of institutional repository manager.

INITIATIVE

It is important that a library director act as a spokesperson who can communicate the library's role in SC (Radom et al, 2012, p. 14). This study indicates that the responsibility to represent SC on behalf of the library now falls to the SC librarian, regardless of position level. Non-administrator positions include responsibilities to lead SC outreach:

“...lead efforts to educate and advise the campus community on issues of open access...”

“...lead efforts to design and deliver systematic and sustainable approaches to scholarly communication outreach.”

“...lead and coordinate outreach

EXPERTISE

Hiring institutions expect the SC librarian to serve as an expert on SC issues for the library and the campus. Job descriptions state the librarian will serve as a resource in SC, whether as simply a “resource,” a “campus resource,” or the “primary resource.” Some ads describe the SC librarian as the “expert” or “point of contact.”

Some postings list specific areas in which the librarian will provide expertise:

“Serves as the university’s primary resource on fair use and other copyright issues...”

“The ideal candidate will provide expertise on open access, open education, copyright, fair use, author rights, and ongoing developments in scholarly communication.”

Some state that the librarian will be the expert in SC in general:

“...serves as the local expert concerning the evolving scholarly communications ecosystem...”

“Provide expertise in scholarly communications and publishing.”

Where institutions describe expertise in desired qualifications, they seek proficiency in software applications or IR platforms. Otherwise, hiring libraries imply desired

» The responsibility to develop also appears in SC librarian position announcements. SC librarians may develop institutional repositories, outreach, services, or partnerships.

expertise through other statements. Regarding actual experience in SC issues, advertisements for administrator positions seek those who have experience in outreach, education, or programming, particularly in developing and implementing such efforts:

“...demonstrated experience providing instruction, consultation, and programming on scholarly communication, copyright, fair use, and intellectual property topics.”

“Experience developing outreach materials and services, such as publications, training materials, workshops, conferences, and other tools relevant to scholarly communication.”

In non-administrator positions, libraries seek applicants who can effectively instruct others in SC issues:

“Experience communicating and conducting outreach about scholarly communication issues to a variety of stakeholders.”

“Communicate scholarly communication issues in a balanced way that can be adjusted to a wide range of audiences across the disciplines.”

“Demonstrated knowledge of and ability to effectively articulate complex concepts, such as copyright, fair use, authors’ rights, and open access as they relate to the academic endeavor.”

“Demonstrated knowledge of Institutional Repositories and the ability to communicate their benefits and address issues related to their use.”

DEVELOPMENT

The responsibility to develop also appears in SC librarian position announcements. SC librarians may develop institutional repositories, outreach, services, or partnerships. The use of “digital” in SC librarian ads “suggests that librarians have responded to the argument that digital libraries should play a greater role in SC, perhaps due in part to their potential for interacting with and facilitating the ‘social life’ of documents,” (Finlay et al, 2015, p. 20). Job postings from 2007 through 2008 tended to focus on digital content development for institutional

repositories and called upon the librarian to help deposit content, for example, by developing procedures and workflows (Xia and Li, 2015, p. 18). Regardless of position level, SC librarians may find themselves responsible for developing a SC program:

“Develop a comprehensive scholarly communications program.” “Develop a successful scholarly communications program.”

“Lead the development of a scholarly communication program...”

“...the scholarly communication librarian sets the vision for the growth and development of scholarly communication efforts...”

Whether SC infrastructure exists at an institution is not always easily discernable from a job advertisement alone, so it is not always obvious if the SC librarian will be building a program from scratch or expanding something already in place. Some institutions describe development responsibilities in terms of creating, growing, or expanding. A responsibility to “expand the SC program” or “grow the institutional repository” implies that a program or an IR is present. By contrast, “creating” an IR or a SC program implies the librarian will be responsible for bringing these things into existence.

DISCUSSION

Job Titles

While many librarians engage with SC issues, the focus on this particular title is important. Job titles contribute to the way individuals define themselves professionally and communicate their professional identity to others (Neary, 2019, pp. 14–15). A job title that communicates a person’s position, duties, and expertise influences the construction of professional identity, whether to express technological expertise (Braun, 2002, p. 46) or to identify oneself as a trained educator (Franklin, 2009, p. 17). Outsiders’ perceptions of a job title can lead to conversations about changing, or abandoning, certain titles altogether. Private law firm librarians have discussed the possibility of dropping the word “librarian” from their titles due to misconceptions: “For example,

the possibility of a client objecting to a charge for librarian time is an issue unique to us. We are also vulnerable to misperceptions within the firm due to desire to cut costs” (Hallows & Bowersox, 2014, p. 12). Administrators may use job titles to communicate their expectations of a position. For instance, companies that rebrand their human resources managers as vibe managers do so, not only to create a certain kind of atmosphere for other employees, but also to express a vision for the role. Fred Bateman, the first CEO to recruit a vibe manager, explains, “Adding vibe to their responsibilities gives them something more meaningful and gives their job more respect. It’s not just answering phones or planning parties, they have to be thoughtful about it” (Anand & Oberai, 2018, p. 12).

Academic libraries communicate a commitment to take an active role in SC by naming positions and departments as such. However, SC as an indicator of actual responsibilities may not be informative or useful to professional identity construction because SC-related issues, needs, and practices are numerous. Institutions may choose to specify certain duties in the job title, such as copyright, licensing, data, or publishing, which are themselves SC-related areas. Further research into the effectiveness of SC librarian job titles in conveying responsibilities or expertise to other library staff or to those outside of the profession is necessary.

Leadership and Authority

Emergent leadership is an expectation indicated in SC librarian position announcements. Because these librarians are not administrators or leaders by title, it is worthwhile to explore the potential gaps between the amount of responsibility and amount of authority these positions have. Leadership is further complicated by gender and racial stereotypes. Librarianship in the U.S. overall is over 80% white and over 80% female (Librarians, n.d.). Men are disproportionately promoted to administrator positions (Newman, 2018; Olin & Millet, 2015). Where women hold assigned leadership roles, they are expected to lead in a gendered way (Olin & Millet, 2015). Epps (2008) reports that

African American women who work as academic library deans or directors feel they have to work harder and are held to a higher standard than white librarians (p. 262), and interviewees felt they needed to cultivate certain attributes that white librarians do not, such as negotiating and persuading or “hav[ing] a thick skin” (Epps, 2008, p. 267). Women and Black librarians in assigned leadership roles have to navigate gendered and racialized expectations of superiors and staff. It would be expected, then, that women and minority librarians in emergent leadership roles would encounter the same, if not worse, problems in carrying out responsibilities to lead or develop ambiguously defined projects or initiatives. It would be useful to learn more about the experiences of SC librarians who have leadership responsibilities without accompanying positional authority, especially those tasked with developing and implementing new programs and services.

Place in the Institution

It is important that job advertisements situate positions in the organizational structure and clarify what, if any, existing SC infrastructure is in place. For example, literature on IR workflow development describes the work as a team effort (Hanlon & Ramirez, 2011; Hazzard & Towery, 2017; Madsen & Oleen, 2013; Marsh, Wackerman, & Stubbs, 2017). Job postings should describe to the candidate any existing SC infrastructure already in place, such as an existing IR or SC department. Noting the titles of the supervisor and other engaged library staff can help an applicant envision how the position fits into the library’s reporting structure and the support network in place.

This is especially important for new SC librarian positions. There are six references in the dataset to either a new SC librarian position or a new department in which the position is located. Readers should not take this to mean that only six new SC positions or departments have been created since 2016. Some institutions may choose not to disclose



that a position or department is new.

Most of the positions reviewed for this study are non-administrative positions, indicating institutions have opted to create new positions specifically to handle SC tasks. Institutions indicate a position or department is new to convey progress, excitement, or importance. One institution describes the creation of the new SC librarian position in terms of the university’s adoption of a new open access policy. Another institution describes a newly created SC librarian position as a “critical partner” who will work to increase the exposure of the university’s scholarly output, as well as “develop related services in the area of research metrics and reputation management.” A third new SC librarian position has a broader focus than the previous two, serving to “expand and manage the Library’s scholarly communications services.”

The focus of each position varies but all three positions have a few things in common. All of the new positions are responsible for engaging with their campus communities and collaborating with other librarians or campus stakeholders. Each of these new positions touch on recurring themes found in the dataset across all positions, namely leadership, expertise, and development.

Boundary Roles and Innovation

Aldrich and Herker (1977) explain that boundary roles serve information processing and external representation functions

of an organization (218). These roles interact with the outside environment by filtering and disseminating incoming information or by communicating information to those outside the organization. “To be effective, libraries must bridge internal silos and reach across borders within the larger institutions that they serve, as well as with outside groups, disciplines, and organizations” (Humphreys, 2018, p. 521). For instance, reference, instruction, or subject librarians connect patrons to services, resources, and information available through their libraries. By doing this work,

librarians serve the external representation function of boundary spanning by representing the organization to the outside environment, transmitting information to stakeholders, and making the organization visible (Aldrich & Harker, 1977, p. 220-221). Boundary spanners also simplify complex outside information and relate it to the organization in order demonstrate its value to organizational survival (Aldrich & Harker, 1977, p. 219). Librarians do this by communicating professional trends or best practices, as well as patron requests, needs, or habits, through the organizational hierarchy to effect policy and procedural changes to ensure the library remains relevant to its community.

Themes present in SC librarian job postings demonstrate the boundary spanning nature of these roles. The leadership, expertise, and development responsibilities in these ads speak to the necessity of effective communication between the organization and the external environment (Tushman, 1977, p. 589). These themes intersect in some way with outreach, instruction, or collaboration with stakeholders outside of the library. For example, Xia and Li (2015) observed a trend in SC librarian responsibilities for digital content development: they point out that responsibilities for digital content development has moved over time from depositing content into institutional repositories, to legal issues of electronic content—including educating patrons about copyright and related issues—to policy de-

velopment, and finally to collaboration with colleagues (pp. 18–19). This trend is evident in the present study in the duty to manage an institutional repository. The result of this IR work is the deposit of content, but this functional aspect is not always explicit in the positions' duties. The management of a repository, whether by an administrator or non-administrator, tends to focus on outreach, policy development, and collaboration with others within and outside of the library. In this capacity, SC librarians are both library representatives to the campus and they facilitate the flow of information from the campus to the library.

Expertise can be a source of authority for roles that do not have formal authority (Spekman, 1979, p. 116). Since 2010, positions increasingly call upon SC librarians to communicate with library users about copyright, intellectual property, fair use, and the public domain (Xia and Li, 2015, p. 19). Libraries commonly offer copyright and authors' rights education and support services (Radom et al, 2012, p. 13; Mears & Bandy, 2017, p. 146). As libraries have taken on a greater role in digital content creation and management, librarians are required to have more knowledge of copyright issues (Kawooya et al, 2015, p. 341). The responsibilities of copyright librarians often overlap with SC issues and there are "strong positive trends towards hiring copyright or scholarly communication librarians with copyright and related matters as their primary charge," (Kawooya et al, 2015, p. 348). This highlights uncertainty between the organization and the external environment, and the expert allays this uncertainty through the ability to filter and translate information, leading to the organization's dependency on the expert (Spekman, 1979, p. 113). The library depends on the copyright expert to translate the complexities of copyright in a way that non-experts can understand. "It is notable that librarians very often serve as copyright educators even though only about a quarter of library scholarly communication leaders have law degrees or have participated in some form of copyright training," (Radom et al, 2012, p. 13). A Juris Doctor (J.D.) is the most commonly sought degree beyond an ALA-accredited MLS for SC librarian positions. Expertise in OA, IR, scholarly publishing, and SC in general are also highly desirable.

In seeking librarians who are qualified to teach others about SC issues, a library describes the way the role's expertise will

manifest and benefit the community. When the SC librarian is expected to be the organization's expert, non-experts may bestow authority to the SC librarian. Further research into the relationship between authority and SC librarians as experts is needed.

Regardless of job title, SC work is boundary-spanning work. Library staff across units and with different duties or areas of expertise must be able to communicate and work together to be effective in delivering SC services, programs, or initiatives. Because so many roles contribute to SC work, "job titles and descriptions, time allocations, salaries, and status can vary greatly among those who do this work, resulting in challenges for both managers who try to lead people who do not report to them and for workers who do not feel acknowledged" (Association of College and Research Libraries, 2019, p. 12). Exploring SC leadership through the lens of boundary spanning roles will be beneficial to understanding how library units interact, understand one another, and contribute to the institution's SC mission. It will also bring attention to positions that do this work, no matter the job title.

CONCLUSION

Graduates of ALA-accredited Master of Library and Information Studies programs are expected to know and use "The concepts behind, issues relating to, and methods for principled, transformational leadership" (American Library Association, 2009, p. 5). In a growing field like SC, it is no surprise that institutions expect SC librarians to be leaders. If the descriptions of SC as "evolving" or "rapidly changing" found in SC librarian position announcements are to be taken as accurate, then it must be acknowledged that the scholarly publishing environment, including publishing practices and the needs of researchers, will change faster than library policies and procedures.

In SC librarian job ads, the authority to manage or administer is often absent from positions that have a responsibility to lead or develop SC efforts, programs, or initiatives. "The goal of leadership without authority is to get others to willingly cooperate and engage, rather than following directives because you're the boss" (Goman, 2017). Librarians who have responsibilities to lead, develop, or implement programs, policies, or procedures but do not have positional authority may still exhibit their leadership potential by being proactive, taking initiative, and communicating with their

superiors. However, those with positional authority—the assigned leaders—must be able to delegate the authority to make decisions and provide necessary support for these emergent leaders.

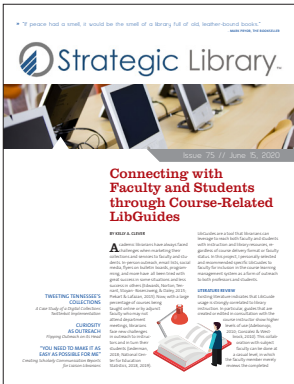
Are the librarians who fill these jobs with leadership, development, or expertise responsibilities authorized to make decisions or take actions to meet immediate user needs in the absence of policy? How much support will they have in effecting policy change to keep up with environmental changes? The success of the SC librarian in leading change or developing new programs will depend on the organizational culture, which cannot be fully discerned from a job advertisement. Libraries should avoid using coded language in SC librarian job advertisements that may discourage women and minorities from seeking leadership and instead, use gender-neutral language that signifies support of innovation and critical viewpoints. Hiring institutions should also be prepared to describe to candidates current SC initiatives and expectations for innovation; existing collaborations, whether stable or in need of improvement; and examples of other successful programs developed by others at the institution. ■

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ABOUT THE AUTHOR: Angela Hackstadt is the Senior Assistant Librarian at University at Albany, SUNY.

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