Using Qualitative Methods to Supplement Quantitative Research: A Case Study in Evaluating Student Usage of Facilities

Matthew M. Benzing
Computing and Engineering Librarian
Miami University Libraries
151 South Campus Ave
Oxford, Ohio 45056

Susan Hurst
Business Librarian
Miami University Libraries
151 South Campus Ave
Oxford, Ohio 45056

Thom Gerrish
Science and Engineering Librarian
Miami University Libraries
151 South Campus Ave
Oxford, Ohio 45056

Abstract

Quantitative research is an important tool in understanding library users; quantifiable data is objective and can be processed and analyzed in ways that bring about new insights. Unfortunately, it is better at telling us where and when than it is at telling us the whys. Our library, the Business, Engineering, Science, and Technology library at Miami University, did a headcount study to see how many people were using which rooms at what times of the day and

night. There were many things we learned from that data, but in order to flesh it out and make it more of a three-dimensional picture of our users we decided to use methods from ethnography. We ran a survey and then interviewed several of the survey respondents. The result was a "thick description" that allowed us to better understand the motivations behind some of the behavior seen in the quantitative study.

Keywords: Qualitative Research, Interviews, Surveys, Facilities, Study Rooms

Introduction

Qualitative and quantitative studies can often be at odds with each other, even though both provide valuable information. Library research that measures pure data, such as how individuals move through a space, numbers of checkouts, or article downloads can produce results that are specific, easily aggregated and quantified, and relatively free from bias (e.g. while the questions being researched, the populations targeted or the contexts the results are placed in may be suscetptible to bias, the numbers are the numbers). The drawback to this kind of research is that it is limited in the kind of answers that it can give. Sometimes it may be enough to know that Tuesday afternoons are especially busy and require extra staffing; however, if the goal is to find out why they are busy, in order to make more involved structural changes, a different approach is required. Qualitative research answers the why, however, it also has drawbacks. Qualitative data is difficult to manage; you cannot just pop an interview into a spreadsheet. Information gained in interviews may be tainted by the interviewer's unconscious cues or the subject's willingness to please.

The B.E.S.T., (Business, Engineering, Science & Technology), Library at Miami University in Ohio is one of four libraries on campus, the others being the Music Library, the Art & Architecture Library, and King Library (the main library). B.E.S.T. serves the portion of our student body that majors in the physical and biological sciences, engineering, business, computer science and information systems, mathematics, statistics, geography, and the social sciences. The library is located across the street from the campus engineering building, providing quick and easy access to library facilities for students in that discipline and is nearby to the business school and psychology and science classroom buildings.

B.E.S.T. occupies all of one and part of two floors in Laws Hall, a building on campus that used to house the Business School, but which was repurposed to serve as library space. It also contains space for the Center for Teaching Excellence and the Interactive Media Depart-

ment. The Library portion of the building includes the basement, which houses the book stacks, as well as some open study spaces. The first floor contains the Information/Circulation Desk, study rooms, printing stations, a computer classroom, a 3D printing area, and two open computer labs. The second floor contains study rooms and librarian offices. The third floor of the building is used for administrative offices and classrooms and has no library space.

The main (first) floor was remodeled in 2011, and discussions have been ongoing about how the other floors might eventually be updated. This led to the research questions that are being dealt with in this article. Our concern was that if the library was subject to future remodeling, how could we best guide those designs?

With the advent of the internet and online databases, ejournals, and ebooks, libraries have long been undergoing changes in how their patrons utilize their physical space. While print volumes do still circulate, and occasional print issues of journals are retrieved, we find that students think of our library primarily as a place to study or work on group projects.
Our study rooms are maintained in an online reservation system, with keys are checked out at the circulation desk, and during the busiest times of year, the desk resembles a hotel during a holiday weekend, with steady queues of students checking keys out and in.

Given that this seemed to be the aspect of our physical space that students found most valuable, we decided that understanding what spaces our students were drawn to and more importantly, why, would be desirable. At first a quantitative study was done, that tracked student movement, resulting in a user generated heatmap. This answered the question of what study areas were the most attractive to students, but it did not tell us why. The answer to "why" was going to be important to any redesign, otherwise we might not know, for example, whether students actually preferred specific areas or if there were other factors, such as a lack of suitable alternatives that were driving them there.

This realization led us to further research utilizing qualitative and ethnographic methods such as surveys, interviews, and some field study to gain understanding of student study room usage. By combining the two types of research we gained a more complete picture of what was happening in the study areas of our library: where students were going and why they were going there.

Literature Survey

As mentioned earlier, library usage studies often focus on counting and measuring things—door counts, available shelf space, circulation records, patron heat maps, etc.

These quantifiable numbers are often relatively easy to determine and if some care is taken, they can be used to show changes over time, as long as the same methodology is used. Increasingly though, with the increased interest in user experience, an anthropological or ethnographic approach is being used to delve deeper into patron motivations and behaviors, (Appleton 2016). When these approaches are focused on specific aspects of university or library design, it can also be referred to as the Rochester Technique, based on extensive research done at the River Campus Libraries at the University of Rochester, (Foster and Gibbons 2007). Often these methods are utilized in conjunction with ongoing quantitative studies, once it is determined that the numbers themselves cannot provide a complete picture of how or more importantly, why, spaces are being utilized as they are, (Khoo et al. 2016; Bryant 2009). Examples of qualitative or ethnographic methods used by academic libraries include flipcharts or easels, (Pierard 2011; Wu and Lanclos 2011), picture taking or photos, (Bedwell and Banks 2013; Lopatovska and Regalado 2016; Newcomer, Lindahl, and Harriman 2016), as well as in-depth student interviews, (Suarez 2007; Tewell et al. 2017), and participant observation (Suarez 2007; Bedwell and Banks 2013). A combination of several of these techniques are also often used together to get at a wider variety of data and user experiences, (Foster and Gibbons 2007; Pierard, 2011). This "triangulation" of data can also provide a better sense of what users' priorities really are, i.e. if the same responses or reactions are observed using multiple types of observation techniques. One method can also lead into another, with participants in an online survey asked if they would like to further participate in additional in-depth interviews, (Foster and Gibbons 2007; Tewell et al. 2017).

Besides observing users within an existing library setting, another focus of the research is often to determine what types of environments users might prefer, if they had a choice. This can be done a variety of ways, by utilizing open-ended questions, requesting patrons to draw or map their ideal spaces, even by literally asking students to model idea spaces using scale models of furniture, as was done in the Rochester research study, (Wu and Lanclos 2011; Foster and Gibbons, 2016). While users can often veer far off into the whimsical when asked about their "ideal" spaces, they typically also provide quite useful information on what they would, (and would not), like to have included in a specific type of space. Whenever considerable overlap is identified between a variety of users and their depictions of an "ideal" design, it is an indicator of an unmet need, (Foster and Gibbons, 2016). The next step is taking the data gathered through these techniques and effectively utilizing it to elicit changes in the spaces, (Gibbons, 2013).

Stage One: Tracking Student Movement

The quantitative study relied purely on headcounts. The intent was to be purely objective, in an attempt to answer the simple question: How many people are in the library at a given time, and where are they.

Users were tracked by student workers carrying maps of the different areas, with "x"s representing patrons. The counts were taken four times a day: 8am-Noon, Noon - 4pm, 4pm - 8pm, 8pm - Midnight for a semester.

Some of the results confirmed expectations, others defied them. Contrary to the stereotype of the night-owl student, late night hours turned out to be the slowest times; on the other hand, 12-4pm on Mondays, Tuesdays, and Wednesdays were the most active time periods, with usage increasing in all time periods toward exam time at the end of the semester, as would be expected.

Usage of study rooms varied. Open study rooms that did not require a reservation were consistently busy, while usage of reserved rooms varied. Afternoons and evenings tended to be the busiest times for reserved rooms, with few reservations made for the morning hours.

Computer lab usage followed a similar pattern, with usage climbing toward the end of the semester.

Carrels are more popular than other types of seating, with older more decrepit carrels being preferred over new tables with comfortable seating sitting nearby.

Overall, the quantitative study answered some basic questions that informed a few quick fixes, such as purchasing more carrels. For a more involved long-term strategy for our library facilities we needed to know more than where and when...we needed to know why.

Stage Two: Survey

The first step to understanding the "whys" of our project was to create, disseminate, and evaluate a survey. A survey can be seen as an intermediate step between the quantitative and qualitative approaches to research. Some survey questions lend themselves to quantitative analysis, (i.e. "What is the most important factor for you in choosing a study room?", or "How far in advance do you typically book a study room"), while others are more open ended, such as "Why do you study at B.E.S.T. Library?".

Survey questions were compiled by a team of librarians, and then entered into an online survey.

The next challenge was to recruit survey respondents. There is no foolproof way to do this. Since you cannot force people to take a survey, you must either offer incentives or rely on volunteers. Both methods have drawbacks. As can be seen on Amazon, TripAdvisor, Yelp, or other sites that rely on users volunteering their opinions, respondents tend to be people with an above average interest in the item they are rating. This interest may be spawned by love or hate, the need to praise or denigrate, but it does bias results towards either fans or those with an axe to grind.
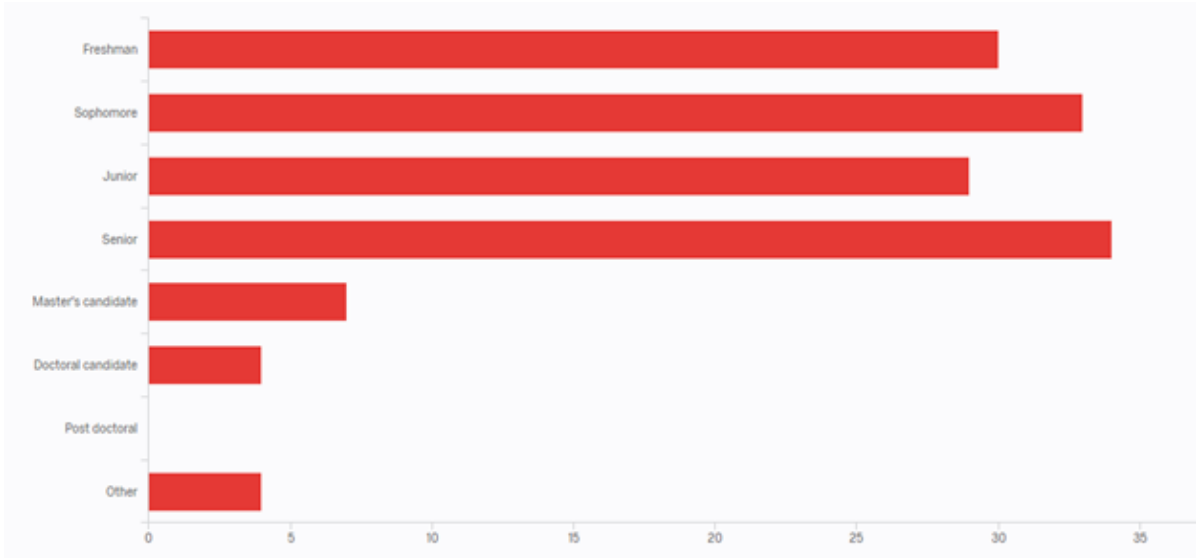
On the other hand, offering incentives may yield respondents with zero interest in the topic who just want the goods. While this is still a form of bias, we decided that it posed less of a danger to the integrity of our survey results than relying solely on self-selection. Not surprisingly though, our funds were quite limited for this project, so we used the most financially inconsequential yet desirable incentive we had available: a chance to win a $40 3D printing gift-certificate. B.E.S.T. Library does quite a bit of 3D printing business, so the tools and materials were at hand. In addition, by having a drawing, we could keep costs down while appealing to the universal human attraction to games of chance. We did have some concern that this might cause students from disciplines that rely heavily on 3D Printing, such as Mechanical Engineering and Physics, to be overrepresented in our sample. We attempted to counter this by showcasing the creative nature of 3D Printing: our slogan was "Print Your Dreams", in an effort to appeal to the novice who has never used the service, as well as to our regular 3D printing customers.

Posters and table cards were printed with the slogan "Help Us Make B.E.S.T. Better", our survey URL and the details of the "Print Your Dreams" promotion. The posters were placed in strategic locations throughout the library, and the table cards were placed on every flat surface. In addition, the electronic signage that is displayed near our entrance and the library website both advertised the survey as well.

The survey contained 22 questions about library study spaces, computer and software preferences, frequency and manner of space usage, and seating preferences. The questions were a mixture of multiple choice and short answer items. At the end of the survey students were asked if they were willing to engage in an interview in order to be entered for a second chance to win a 3D Printing gift certificate, and if the answer was "yes" they were prompted to submit their email. Otherwise, all respondents were anonymous.

The highest number of responses came from Biology majors (19) and Mechanical Engineering majors (12). While this could be a representative sample of our regular users, it may also reflect an unintended bias created by our choice of 3D printing as an incentive; mechanical

engineering and biology majors are frequent users of our 3D printing services.

Graduate students made up a small minority of total responses, and undergraduate responses were more or less evenly distributed throughout college years:

Environmental Aspects

We asked several questions about why our respondents chose B.E.S.T. Library and what they liked (and didn't like) about the study spaces B.E.S.T. Library offers.

Some of the main attributes that were mentioned in the survey were "atmospheric" or environmental conditions. Studying is a very idiosyncratic task and people need a variety of spaces and conditions to engage in this endeavor. Thus the varied responses to one of our initial questions: "Why do you study at B.E.S.T Library?"

This word cloud gives a visual representation of the 118 responses.

Some of the most frequently used terms were environmental ones, such as "quiet" or "quieter", which was mentioned a total of 36 times. The next most frequently mentioned term was "crowded", as in "not crowded", "less crowded", "not over-crowded", etc. Altogether, crowding and the lack thereof was mentioned 16 times. This is also a relative term, as it is often used in comparison to King, the other major library on campus. King Library is a larger facility and has more traffic and an increased noise level, as compared to B.E.S.T. Library.

Physical proximity to classrooms or dorms is also a key consideration, with terms such as "close" being mentioned 17 times, "location" 11 times, and "convenient" or "convenience" mentioned 9 times total. Location was especially important to engineering majors, which is not surprising given that the engineering school is across the street. "Comfortable" or "comfy" were also mentioned 9 times by respondents, sometimes specifically in regard to furniture and seating, (which will be addressed in a separate section of this report), but also often just in regard to the library atmosphere in general. One patron's quote sums it up as "B.E.S.T. is unique because the vibe is quiet, down to earth, yet inspiring".

Our next question was in a similar vein but asked respondents to focus on specific aspects within B.E.S.T. Library, versus why they choose B.E.S.T. Library in the first place:

#	Answer	%	Count
1	Access to electrical outlets	68.25%	86
2	Comfortable seating	68.25%	86
3	Privacy	58.73%	74
4	Access to work surface, such as a desk	80.95%	102
5	Noise level	78.57%	99
6	Group seating available	21.43%	27
7	Other	5.56%	7
	Total	100%	126

Other Answers:

All of the above with noise level being the #1 issue, privacy being 2nd with all other ideas following

need computer
White board
Clean
Sometimes Ethernet port is important
good airflow/AC
Public computer available

Since respondents were encouraged to choose multiple attributes, we received 481 selections from a total of 126 respondents, indicating numerous factors are necessary for users to be comfortable in their environment. Our choices here focused more on physical fixtures such as seating, access to power sources, and work surfaces, but it is obvious that less tangible items such as privacy, (selected by 59%), and noise levels (79%) are also prime concerns. The importance of noise, or more importantly its absence, goes back to why quiet was the most frequently mentioned term in the previous question.

The next question looks more specifically as to the use of individual study rooms within B.E.S.T. Library. These are rooms that are reserved by students for up to 2 hours at a time, which can be reserved online, up to two weeks in advance. These "reservable" study rooms are also available in three other locations on campus, King Library, the Art & Architecture Library, and the Armstrong Student Center.

#	Answer	%	Count
1	Yes	62.90%	78
2	No	37.10%	46
	Total	100%	124

Of the 124 responses we got for this question, approximately two-thirds (63%) indicated they sometimes used these study rooms, while slightly over one-third (37%) stated they did not.

We then went on to ask the next logical question, "If you do not use study rooms, why not?"

We got 48 responses, which is interesting, since only 46 said they did not use study rooms in the previous question, although it may be that some of the respondents who occasionally use rooms may have been explaining why there are times when they do not.

This question was structured as an open-ended one, so we got a variety of responses. Of those 48, seven (14.5%) stated they did not realize B.E.S.T. Library HAD study rooms – perhaps a little public awareness campaign could be used here. Over 41% (20) indicated that they didn't feel the need to use a study room – either they were studying along and felt the rooms were only necessary for group study or else they stated a preference for studying in common areas versus a private room. The remainder listed other reasons, including not wanting to make the effort to reserve a room, preferring to use public desktop computers and/or specific software, (which are not available in the study rooms), as well as some other "environmental" aspects such as rooms being too stuffy or smelly, not liking to feel closed in, too cold, bad lighting, etc.

From here we turned to those who did use the private study rooms, at least occasionally, asking them "What is the most important factor for you in selecting a study room?" Once again, noise level led the list, with 66% noting that this was a primary factor for them. Privacy and comfort were right behind, with 59 respondents selecting both those areas as key.

The number of seats is also an obvious choice for those using the rooms for group projects, as some rooms are larger than others. Of those that responded with an "other" response, only one mentioned anything remotely "environmental", and that was again related to noise. In this case though, the respondent mentioned keeping noise away from others, reminding us that study rooms are good both for keeping noise in as well as out. The fact that some of our study rooms have windows while others do not has been mentioned anecdotally as a reason for selecting one room versus another, but this was not listed by anyone specifically. Lighting in general was chosen by over one-third of respondents, however, so some may be indicating the importance of natural lighting from the outdoors as well as the need for adequate lighting overall. Temperature is also certainly another key environmental factor and one unfortunately that the library does not have much control over. As mentioned, some study rooms do have windows that can be opened, while others have individual room radiators that can be used to moderate the temperatures, so students familiar with those features may also take them into account as well.

#	Answer %		Count
1	Technology available	24.14%	28
2	Privacy	50.86%	59
3	Noise level	66.38%	77
4	Amount of seating	49.14%	57
6	Lighting	36.21%	42
7	Comfort (temperature, comfortable seating, etc.)	50.86%	59
5	Other	7.76%	9
	Total	100%	116

Other

keeping noise away from others
I'm usually not the one that books them
white board and size
what's available
Ethernet ports
white board
Whiteboard
Wi-Fi accessibility

However, it is also noteworthy that one of the "other" answers was "what's available". This illuminates the fact that many students who use the study rooms reserve them at the last minute, so they take whatever is available, regardless of personal preferences. To quantify this issue, we asked "How far in advance do you usually book a study room?" Of the 124 responses, over 44% responded that they either reserve them the same day they use them or just walk in and see if any rooms are available.

Only 27% indicated they typically reserve them a week in advance and just 6% reserve them two weeks out, which is our maximum time frame for making study room reservations. Thus, personal preferences for specific types of study space do not seem so strong as to outweigh the tendency to wait until the last minute to reserve a room, at least for most students.

#	Answer %		Count
1	Two weeks	4.84%	6
2	One week	27.42%	34
3	Same day	30.65%	38
4	I just walk in and see what's available	13.71%	17
5	I don't use study rooms	23.39%	29
	Total	100%	124

Seating

As has been stated above, 68% of respondents mentioned comfortable seating as one of the most important factors in choosing a place to study.

However, everyone has a different idea of what is "comfortable". To get at this, the survey had two questions with photos of real seating arrangements currently available in B.E.S.T. library and asked respondents to choose which they typically preferred. In the case of the first two seating options, results were about even.

48.33%   58
51.67%   62

Comments about both included concerns about an insufficient lack of space on desks, especially space for a laptop. Also, there were a few concerns about option #2 chairs being too comfortable and encouraging sleep.

With the second set, however, the results were more decisive:

39.67% 48
60.33% 73

The strong preference for option #2 seemed to be oriented around environmental issues such as privacy and lack of distraction, due to the "blinders" that carrel type seating provides.
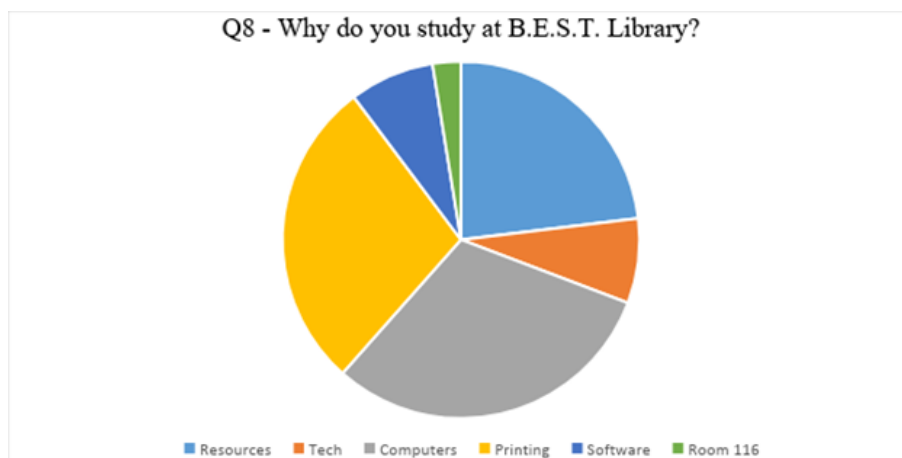

As with the previous set, there were scattered comments about the necessity (and lack) of electrical outlets. It is interesting given the comments in the previous section about "comfortable" seating, that the preferred option in both questions were seats that at least appear less comfortable. Perhaps there is a disconnect between thinking about "comfortable seating" in the abstract and looking at actual photographs that bring about memories of having used particular configurations. Also, many students at B.E.S.T. are here for the express purposes of studying or completing assignments. What they are looking for may not be "comfort", as much as furniture conducive to those tasks. Thus, the comments about the chairs in the first set of photos "being too comfortable and encouraging sleep". That is NOT what you need when you have work to do.
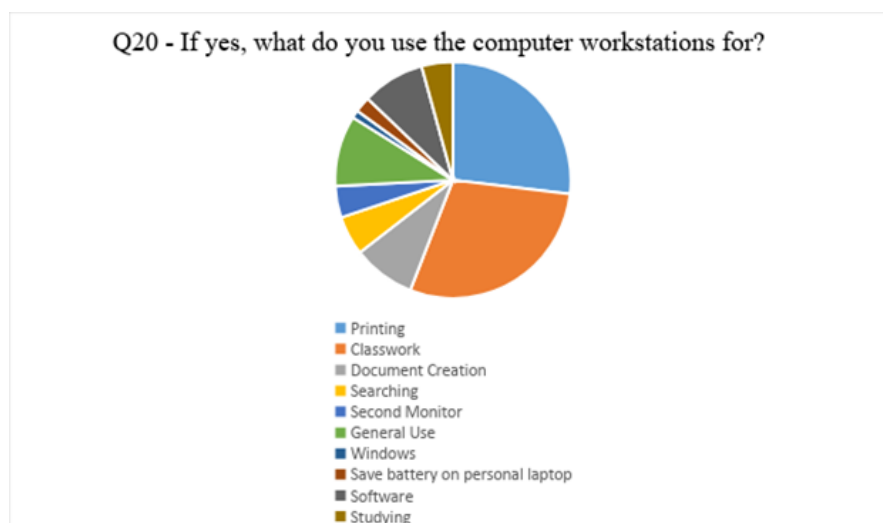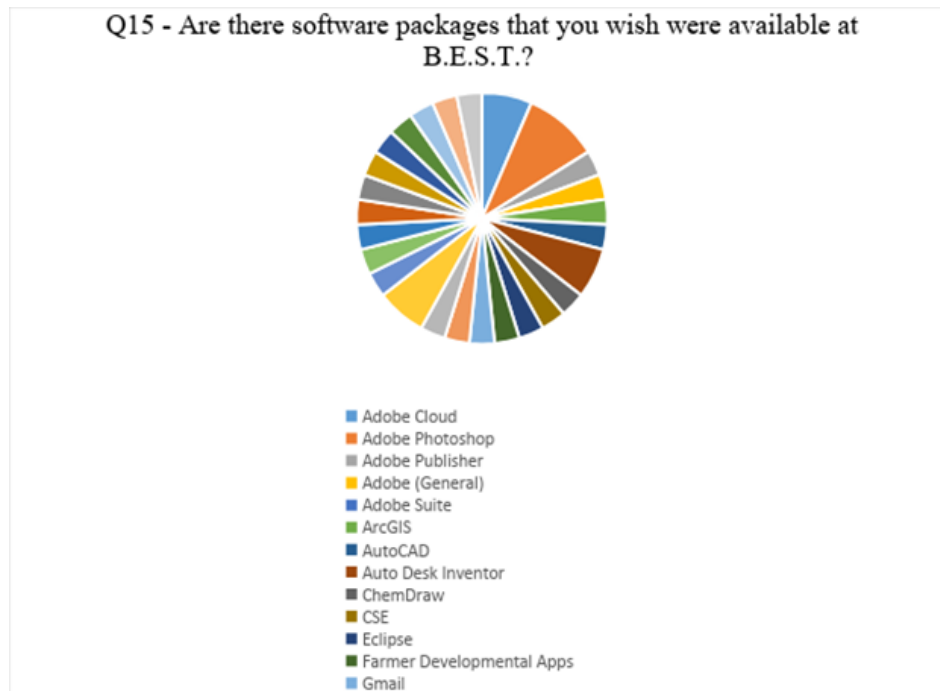
Computing and Technology

When asked why they study at B.E.S.T. Library, 26 mentioned technology-related factors. The breakdown can be seen in the chart below:

When asked what is important to when selecting a study room, 23 respondents chose "Technology Available", with 2 specific callouts for Wi-Fi access and Ethernet ports. When asked what they use solitary study rooms for, 7 again specifically mentioned technology-related activities: watching movies, listening to music without headphones, Facetime/WebEx, Skype interviews, recording video for interviews, and doing online classwork. When asked if they used the computer workstations at B.E.S.T., 52 respondents said no. Out of those who said yes, 63 again mentioned technology-related factors. Printing and searching were the most common uses, which is no surprise, especially since printing in our library can only take place through our workstations. They breakdown as:
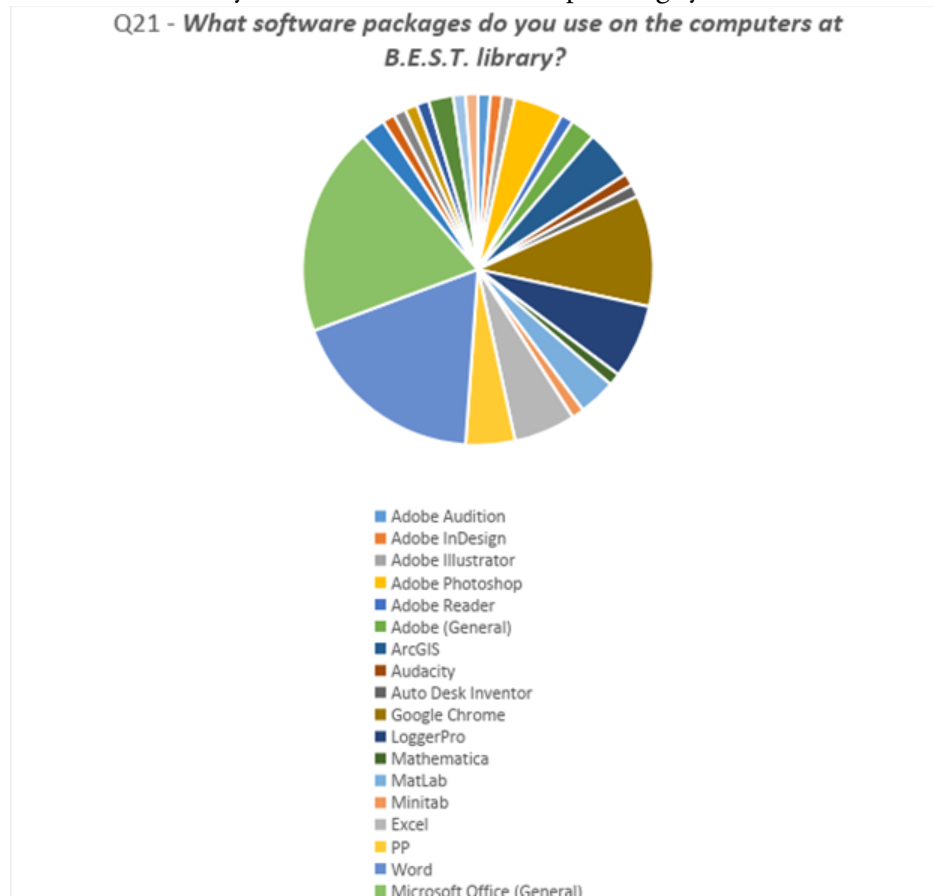
When asked which software packages they use at B.E.S.T. Library, only 53 gave specific examples. The two most frequently mentioned were Microsoft Word (16), and Microsoft Office (17).

Q15 - Are there software packages that you wish were available at B.E.S.T.?

Legend:
- Adobe Cloud
- Adobe Photoshop
- Adobe Publisher
- Adobe (General)
- Adobe Suite
- ArcGIS
- AutoCAD
- Auto Desk Inventor
- ChemDraw
- CSE
- Eclipse
- Farmer Developmental Apps
- Gmail

While general productivity software such as Microsoft office was mentioned the most, note the wide variety of software used overall, with 26 different programs or sub-programs listed. This may be a factor of the library's clientele, which is largely composed of students in STEM fields. This also explains the highly mathematical and technical nature of many of the programs in use.

Respondents were also asked if there were software packages that they wish were available on the B.E.S.T. Library workstations, with 28 responding "yes".

This presents an interesting issue: some students apparently do not realize we already offer the software applications or suites they would like to see at B.E.S.T. Of the 27 responses listed above, less than half (13) are programs NOT currently available on at least some computers in B.E.S.T. Those are Maple, SAP, CSE software (programs specific to the Dept. of Computer Science and Software Engineering), Visual Studio, Eclipse, integrated developer environment apps, Net Beans, Word Perfect, Farmer School of Business software, LaTex Editor, programming language software, Unity, and Xcode. All of the rest are available (and many were mentioned by students in the previous question).

This could be remedied by having more signs posted by the computers, stating which software applications are available.

Comparing the responses to demographic information, we find that ArcGIS was requested by Urban Planning/Public Administration and Zoology/Environmental Science majors, while majors that requested Logger Pro were Biology, Pre-Med, and Software Engineering.

Mechanical Engineering majors requested MatLab and Minitab. Since each of those software programs are currently available in B.E.S.T., we can also target those specific departments, perhaps through their librarian liaisons, to make sure faculty and students are aware of the existence and locations of the computers running those specific programs.

Stage Three: Interviews

After our analysis of the survey data was completed, we selected seven students for interviews. These students were selected based on their academic class year and their major, in order to give ourselves a balanced set of responses.

We interviewed seven students:
A Female Junior Biology/Neuroscience Co-Major
A Female Junior Microbiology Major
A Female Sophomore English Major
A Male Senior Microbiology Major
A Female Junior Public Administration Major
A Female Sophomore Premed Major)
A Male Freshman Interactive Media Major

The most obvious distortion here is the preponderance of females: Five females and two males. Miami University's overall male to female ratio is almost evenly balanced, so this does not accurately model the campus in terms of gender. In some ways we were limited by the pool of respondents who were willing to be interviewed. Biological sciences might also seem to be over-represented, at four of the seven were in those fields, while the remaining three were in humanities and social sciences, but students in the biological sciences do tend to be some of our library's heaviest users.

With interviewing, we move farther from quantitative data into qualitative data; these results are both more conducive to narrative and more resistant to breaking down statistically, although it is possible to categorize similar responses and discussions.

All of the interviewees grew up using their local public libraries on a regular basis; interestingly though, two said they rarely used their high school libraries, and for two the question was moot because their school and public libraries were combined. When questioned about libraries in general, one student responded with an image from a favorite childhood movie:

"A specific image that the word library triggers is Beauty and the Beast when she just walks in and it's a room of just hundreds and hundreds of books."

The other students' responses focused more on computers and studying. This reflects the transition from print to electronic that has been changing libraries for several decades, especially since many of the public and school libraries that these students grew up using often functioned more as public computer labs and technology centers, versus traditional reading rooms with book stacks.

Several students mentioned that they like to study with headphones on, either because they like to listen to music while studying or because they want to block out noise. "In general, I don't like to hear things – I always have headphones in. I play music very quietly because I don't enjoy pure silence whenever I'm studying unless I'm solely concentrating on something". In fact, music seems to be an integral part of studying for many of these students. Several mentioned the types of music that they like to study to. This does not lend itself to any particular facility proposals, but it does raise the question of whether the traditional library standards of silence are still valid. Not that it should be blasting from the stacks as it does throughout our small college town on warm weekends, but perhaps quiet contemplative music could have a place in our library.

Food is another traditional bugaboo for libraries and remains a concern for students, as well. One student used the word "food" six times during a twenty minute interview, (and "microwave" four times!) Our libraries do allow food in all areas now, a change from days past, but the proximity and availability of food during marathon study sessions is an issue. Our library has a small vending area, (with notoriously fickle machines; the coffee machine pays off at a rate slightly better than that of a slot machine), but the choices are obviously limited. King, the flagship library on campus, has a café that offers coffee drinks and sandwiches. Several students expressed a desire that the B.E.S.T. facility offer something similar.

Several students discussed the atmosphere in B.E.S.T. compared to the atmosphere in King. As one student put it, "I feel like I can feel the stress in King, so I only really come here [King] when I have a project or if there are more study rooms here." There was a general consensus that King is a hive of activity and therefore not conducive to the sustained concentration that individual study requires. It is worth noting that King does have a "quiet study" area, although our students did not mention this in their characterizations of King as a place where "...there's a lot of people stuff going on and people moving through".

B.E.S.T. was also preferred for its physical layout: "I prefer the homier…like the tight bookcases, little nooks and crannies", said one student, while another pointed out that the study areas were "secluded". Parts of B.E.S.T. Library, especially the basement stacks, can accurately be

described as labyrinthine; while this is seen by some as a drawback, (especially those looking for a specific volume on the shelf), many students seem to enjoy it as an environment that encourages staking a claim on an unused corner or alcove and feeling appropriately sequestered.

B.E.S.T. has various types of seating available, from traditional carrels to ergonomically designed sling chairs, or as one student described them, "bendy chairs". One student stated a preference for these chairs specifically when it came to reading academic articles, she prefers to "lounge back" in them, although she also admitted the dangers that come from chairs that are too comfortable: "I've definitely taken a nap there, once or twice".

Conclusions

How does the information gathered from our interviews and survey supplement the information gathered through our headcount and heatmaps? By providing more details and specific suggestions, qualitative data, particularly from the in-depth interviews, can provide a much needed "student viewpoint" regarding various physical library attributes. While the extremely small sample size of just seven interviewees is not enough to justify making substantive changes, when their suggestions or comments are further borne out by larger trends from the survey or quantitative data, it gives added weight and texture to the results.

Questions about student study habits help to flesh out the results found in the quantitative study. That study told us that reserved study room varied greatly in their usage but gave no indicators as to why this might be the case. Interviews and surveys taught us that students prefer B.E.S.T. Library for study due to its relative quiet and seclusion, as compared to the hustle and bustle of our main library. Students enjoy the labyrinthine nature of the lower floor, which encourages seeking out and staking claim to secluded areas. Again, a quantitative study can show us that some of these remote areas are being used, but it cannot tell us whether or not the students specifically chose these areas, or just ended up there because there was nowhere else to go.

The quantitative study gave no indication of the importance of access to food for student during extended study periods, yet this was a common concern that came up during interviews. While the quantitative study did track usage of study rooms, there was no way for it to alert researchers to factors such as whiteboards, that enhanced the study experience for students and influenced their choice of rooms.

The quantitative study noticed that the computer labs were not heavily used; in the qualitative study, one of the things we noted was that students were not aware of the software that was available on library computers. This tells us that the problem with our labs is not that

we do not have the right software packages, but rather that we need to better advertise what we do have.

Overall, a multi-pronged research approach provides richer and more useful data that can be used in a variety of ways such as making more efficient staffing schedules or prioritizing specific furniture or study room upgrades. To best serve our patrons, we need to know as much as possible about their needs and preferences. Both quantitative and qualitative data are useful on their own, combining the two can result in benefits greater than their individual contributions might suggest.

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Declaration of Interest Statement
Declarations of interest: none