A case study of Singapore Management University Libraries: Adopting a mixed methods approach towards collection evaluation

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Introduction

Given increasing budgetary constraints, many academic libraries have adopted a patron-driven acquisitions approach ("PDAA") to collection development, where the collection is built based on users' needs (Nixon et al., 2010, p. 120).

The growing departure from buying prolifically makes the process of regularly evaluating the library collection especially crucial, since libraries must determine if the library users' needs are still adequately being met. In the context of academic libraries, collections must be regularly evaluated to ensure they support the teaching, learning and research needs of the university (White, 2019).

Collection evaluation helps librarians understand what resources are available within the collection and how well the collection is meeting its goals (Agee, 2005). It identifies areas of strengths and weaknesses in the collection (Oseghale, 2008), and provides an effective measure of the collection's actual utility for its users (Johnson, 2009).

By providing relevant and sound data, it allows librarians to ascertain which resources should be acquired to optimize the budget, so that effective collections can be built (Finch & Flenner, 2017), thereby eliminating the risk of acquisition decisions being uninformed and subjective (Finch & Flenner, 2017).

One common method of evaluating collections is citation analysis, where the target users' publications' cited references are analysed for trends. This allows a better understanding of library users' research needs, and identifies weaknesses in the collection (White, 2019).

Whilst useful for measuring actual usage of resources, this alone does not paint a comprehensive picture of users' needs since it is unable to identify their particular perspective (White, 2019). Recognition of this has led several studies to complement citation analyses with other more qualitative methods such as surveys (White, 2019).

This article seeks to investigate if the Singapore Management University ("SMU") Libraries' current PDAA to collection development is able to meet users' needs by adopting a mixed methods approach. First, a citation analysis of SMU-affiliated publications from 2017-2018 was conducted. Second, the results of the Library Service Quality Survey of 2018 ("the survey") was assessed. Finally, interviews were conducted on for a sample of postgraduate ("PG") and undergraduate ("UG") students ("the interviews").

Literature review

The role of academic libraries

Prior to the information and technological advent, academic libraries were the main repository of information, which was primarily in print (Anunobi and Okoye, 2008). This changed with the technological wave and omnipresence of freely available information (Anunobi and Okoye, 2008).

In today's digital age, the focus of academic libraries has shifted from traditional collection-building, towards building a hybrid collection and providing quality services (Pinfield et al., 2017) that are able to support the learning, teaching and research needs of the university's users (Anunobi and Okoye, 2008). This happens while libraries try to maintain their relevance in a society where alternative information sources are easily accessible with the internet (Anunobi and Okoye, 2008).

Users' preference for digitized content has also shaped the way academic libraries make their acquisition decisions, with many preferring electronic resources (Anunobi and Okoye, 2008). Having access to electronic resources means that library users no longer have to physically visit the library premises, and are instead able to conduct their research off-site (Tunji et al., 2011). This also means that a lot of the space initially allocated to physical resources may now be repurposed as study and teaching spaces.

Academic libraries have also been altered by the combination of ever rising costs of resources, shrinking budgets and administrative challenges, which makes the decision of what resources to acquire an especially crucial one (Anunobi and Okoye, 2008).

Another aspect which has changed the landscape of academic libraries is the increased emphasis of universities on research (Rasul and Singh, 2017). Many universities strive to support research better by making available funds and providing supporting facilities (Rasul and Singh, 2017). Postgraduate students are assessed on their ability to conduct research projects for their dissertations or theses, and

faculty members are required to do research to get tenured (Rasul and Singh, 2017). With this increased emphasis on research, academic libraries find themselves tasked with the critical role of providing users with a collection that will support their research, in addition to just teaching and learning (Rasul and Singh, 2017). In light of this, academic libraries must relook how they are better able to support the faculty and postgraduate students in facilitating research (Rasul and Singh, 2017).

These changes have forced academic libraries to adapt to keep up with changing times, or potentially lose their relevance. Several suggested strategies for academic libraries to cope with the changes include inculcating a preference for electronic over print resources, shifting the focus of libraries from purchasing resources to curating the collection, and redeveloping the library as a study space (Lewis, 2007).

Patron-driven acquisitions

PDAA has been a growing trend in librarianship (Fulton, 2014).

Historically, libraries built collections based on their knowledge of what the users would be interested in (Nixon et al., 2010), often adopting a "just-in-case" approach (Fulton, 2014). However, this involved a fair bit of guesswork (Fulton, 2014), and studies showed that usage of what had been acquired was often low (Nixon et al., 2010), meaning that the majority of the collection was underutilized. As library budgets were cut and resources became more expensive, there was increasing recognition that a different approach was needed towards collection building that was better able to meet the users' immediate needs (Fulton, 2014).

As the 21st century came around, many libraries started to believe that acquisitions should be driven by what was needed by the users and the PDAA became increasingly common (Nixon et al., 2010), especially among academic libraries (Fulton, 2014). The rationale was that the collection should be built based on what the users actually needed, as opposed to what the librarians thought they needed (Nixon et al., 2010). As observed by Nixon, Freeman and Ward, "What better way to build at least a portion of the collection than by letting the users' directly expressed needs guide the expenditure of scarce collection development funds?" (Nixon et al., 2010)

By adopting this approach, not only would the requesting users' needs be met, there was also a high chance that another user would find the same resources helpful (Nixon et al., 2010). Additionally, this approach ensured less wastage of resources and freed up space which would have been used on unused books for more study space (Fulton, 2014).

Despite its benefits, one of the main criticisms of the PDAA is that was that while it is able to immediately address the current informational needs, this does not necessarily mean alignment with the long-term goals of the academic library (Fulton, 2014).

Collection evaluations in academic libraries

The purpose of academic libraries is to support the learning, teaching and research needs of the wider academic institution (Khan and Bhatti, 2015) and a major challenge is to create an effective collection that is able to meet these needs, in addition to managing a limited budget and rising resource costs (Fuchs et al., 2006).

In light of this, academic libraries undertake the crucial task of collection evaluation to determine the collection's weaknesses, how budgets can be optimized, and assess whether the utility of the library is being maximized (Henry et al., 2008).

Libraries have adopted various methods and approaches in evaluating collections (Agee, 2005) including citation analysis, analysing interlibrary loan requests, assessing syllabi, and conducting surveys, focus groups and interviews (Agee, 2005). Methods can be qualitative in focusing on the users' subjective perspective, quantitative in focusing on quantities and numerical data, or a combination of both (Johnson, 2009). Therefore, an effective collection analysis should ideally comprise a combination of methods best suited to the purpose of the study (Johnson, 2009).

Citation analysis

One popular collection evaluation method among academic libraries is citation analysis, a bibliometric analysis method that assesses the citations in publications to determine user behaviour and trends, and the relative importance of different resources, based on the number of times they have been cited (Edwards, 1999; Hoffmann & Doucette, 2012).

Checking the citations against the library's holdings also allows the librarian to see the extent to which the collection is able to support users' research needs (Edwards, 1999), and provides data to support effective and informed collection development decisions (Ke & Bronicki, 2015).

It has also been recognized as a relatively non-invasive collection evaluation method, as it relies on publications that are already public (Johnson, 2009) and is less susceptible to individual bias (Zupic & Cater, 2015).

A common phenomenon observed is the 80/20 rule, which states that 80% of the cited resources can actually be found in 20% of the cited journals (White, 2019). By identifying this 20% of highly cited journals, it is possible to determine the "core" journals most crucial to the research needs of a population (Edwards, 1999).

However, one limitation is that a reference list may not comprehensively list all the resources consulted. Additionally, the author could have cited the resource for reasons other than it being important to the research. (White, 2019). Users also have a tendency to cite what is readily available (Haycock, 2004).

User perception

User perception has increasingly been recognized as a key consideration when assessing library services.

In Basharun and Isah's study, a survey was sent to ascertain academic staffs' perceptions of the University of Ilorin library's electronic resources. (2011) Likewise in Annamalai University, a questionnaire was used to ascertain the effectiveness of the library's electronic resources and reasons for not using them. (2010).

Murphy's study in the University of Washington Libraries also utilized a survey to faculty and students to assess their satisfaction with the library's collection and services, and understand how faculty and students utilized the collection, and their information needs and priorities (2013).

Oseghale further stressed the key role of faculty opinion, in the context of collection development, stating that this would assist in identifying the collection's strengths and weaknesses (2008).

Mixed methods approach

It has been observed that using mixed methods is best in providing a complete understanding of the collection since different methods have their respective merits and limitations (Johnson, 2009), and there are several studies that have enhanced citation analysis by using other qualitative methods (Murphy, 2013).

For example, Rossman conducted a holistic collection analysis by utilizing a citation analysis study, LibQual+ survey results, subscription requests and interlibrary loan data (2013). Fuchs, Thomsen, Bias and Davis, complemented a citation analysis with a survey to gain additional insight into the users' views of library services and resources (2006).

While there are not many studies that have done so, conducting interviews is another useful way to bolster citation analyses. Hoffman and Doucette noted that the limitations of conducting citation analyses alone can be alleviated by conducting complementary studies such as faculty interviews, which provide a more complete picture of the citation analysis study's findings (2012).

<h1 style="text-align:center">Methodology</h1>

Introduction

This research conducted a holistic analysis of SMU Libraries' collection through a mixed methods approach utilising a collection analysis on SMU Libraries' publications' references from the years 2017 to 2018, evaluation of the survey, and interviews with selected undergraduate and postgraduate students. As seen in the literature review, each method has been individually, but very few have adopted not just two but three methodologies, both qualitative and quantitative, in assessing the collection.

Citation analysis

The research looked at SMU-affiliated publications from 2017-2018 on Scopus, a comprehensive and powerful citation database (Elsevier, 2020). SMU-affiliated publications were selected because they were written by SMU users who would likely have used the SMU collection. By analysing these citations, it was possible to discern SMU users' research needs and resource usage, in addition to providing the necessary data for better acquisition decisions (Margaret and Lesher, 1995).

Given that the number of references from all SMU-affiliated publications was very large, a representative sample was selected (Hoffmann and Doucette, 2012; McLeod, 2019) using random sampling to reduce possible bias.

A sample of 500 references were randomly selected from the 34,623 SMU-affiliated publications from the years 2017-2018. Each reference was checked against the library's existing holdings and open access resources. The rationale was that if the resource was freely available, the users' specific information need has still been met.

Library Service Quality Survey

To understand users' subjective experience with the collection, in addition to assessing actual usage, the Library Service Quality Surveyof 2018 was assessed (*2018 Survey Results | SMU Libraries*, n.d.). This survey focused on assessing

different aspects of library services and resources such as reference services, library spaces, and the collection.

The survey was emailed to the SMU community in 2018. To ensure that users' privacy was protected and to incentivise honest feedback, the results were anonymous, with only the position and discipline of participants being noted. Email was used to ensure a quick and low cost method that would elicit a high response rate (Grauerholz & Donley, 2012).

This method was selected because like many user surveys, it was able to produce a large amount of data and reach a wide range of users (Kelley et al., 2003). This survey also covered relevant issues regarding users' experience using the library collection.

It was also useful because it asked participants to rate different services and resources in terms of importance and performance, from a score of 1 to 7. The discrepancy of the performance and importance scores, or the gap, indicated an area of improvement since this meant that a specific area of assessment was deemed to be very important to the users, but the actual performance fell short of that (2019). Ideally, the more important a service or resource was to the user, the better the performance should be so users' expectations would be met.

For the purposes of this particular research, only relevant questions relating to the library collection were considered. This included:

1. The Library anticipates my learning and research needs.
2. Information resources located in the library (e.g. books, journals, DVDs) meet my learning and information needs.
3. Course specific resources (online and the reserve collection) meet my learning needs.
4. Access to Library Information resources has helped me to be successful at university.
5. The items I'm looking for on the library shelves are usually there.

The performance and importance scores for each question, for the different participant groups were assessed, and the gap scores calculated for analysis.

There were a total of 2631 participants for this survey, including:

- 2109 undergraduate students

- 15 exchange students

- 233 masters students

- 46 doctoral students

- 13 professors

- 25 associate professors

- 20 assistant professors

- 27 researchers

- 111 from other administration positions

- 32 others

Figure 1

Participants' breakdown

PARTICIPANTS
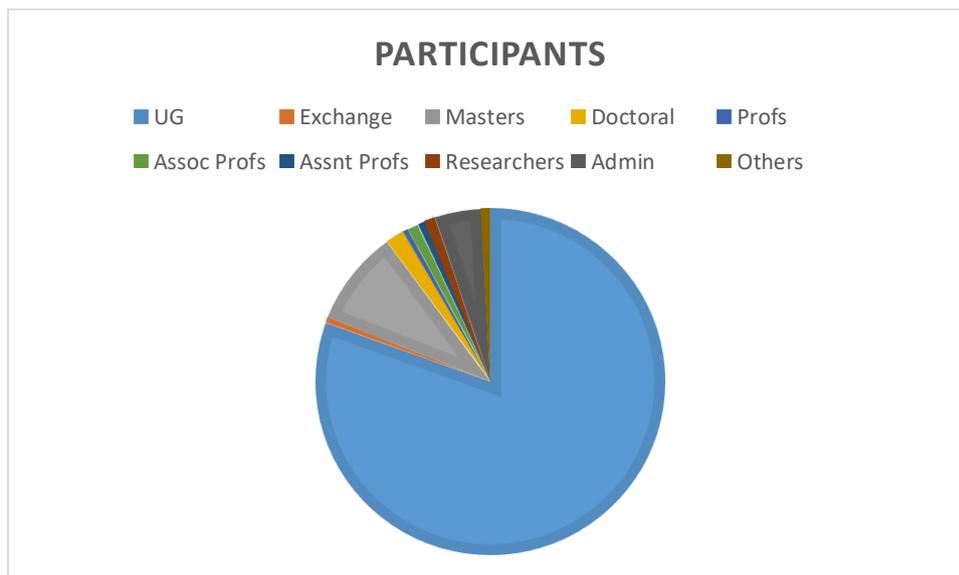
Interviews

To better understand the user perspective, interviews were conducted on postgraduate and undergraduate students.

Interviews are one of the key qualitative research methods and are valuable because they allow the respondent to share his or her subjective feelings, thoughts and ideas on an issue (Gubrium, 2001).

When crafting the interview, it was important to identify the purpose, and select an appropriate interview style and structure that suited that purpose (Pickard, 2013).

The purpose of the interview for this particular research was to understand users' perceptions towards SMU Libraries' collection. The participants selected were postgraduate and undergraduates because they made up the largest proportion of SMU users. A standardised open-ended interview method was adopted, where a fixed set of questions about the collection were asked, and the interviewees given some leeway in responding (Grauerholz & Donley, 2012). This structure ensured the main issues were covered, while allowing the interviewee tell the story in their own words and share further insight (Grauerholz & Donley, 2012).

Given the coronavirus outbreak at the time of the interviews, it was difficult to organize traditional face-to-face interviews (Dodds & Hess, 2020). All 6 participants were given the chance of doing the interview remotely (e.g. WhatsApp), which almost all participants opted to do.

Challenges and ethical considerations

This study had several limitations. Scopus is not comprehensive (Yang and Meho, 2006), and only includes references from 1996 onwards (Li et al., 2010). Coverage of publications also depends on the subject (Yang and Meho, 2006). Scopus also mainly indexes certain document types, such as journal articles, conference papers, science web sites, and patents (Li et al., 2010). There was always a chance that the participants answered the survey in a way that was deemed socially acceptable, instead of how they really felt, resulting in the survey overinflating the quality of the service or product assessed (Grauerholz and Donley, 2012). The participants may also have agreed to take part in this research because they felt especially strongly about the library services thereby providing a bias of opinions. (Lefever et al., 2007).

The scope of the interviews was also limited, since interviews were only conducted on a small number of library users. The nature of the data collected from interviews was also highly personal and as noted by Pickard, there was a danger that data collected was not necessarily factually accurate and more a "perception of the interviewee" (2013, p. 206).

Additionally, the study happened amid the coronavirus outbreak. While social gatherings were not prohibited at the time, they were nevertheless discouraged to control the spread of the virus. As such, it was challenging to organize face-to-face interviews, with virtual or chat interviews being largely preferred by the participants.

While the same set of questions was utilized, the dynamic of the interview and what the participants chose to share might have been different in a face-to-face setting (Dodds & Hess, 2020).

A major ethical consideration when conducting user studies is respecting users' autonomy and privacy. Care had to be taken to collect only necessary data and users were informed of the purpose of the study (Grauerholz and Donley, 2012). It was also crucial to obtain informed consent (Grauerholz & Donley, 2012).One of the benefits of using Scopus publications for the citation analysis was that privacy issues are less of a concern, since the publications are indexed on a public platform and intended for wide circulation. It would be different if the analysis had been done on undergraduate's papers, which are typically intended for a much smaller audience (Currie & Monroe-Gulick, 2013).

<p style="text-align: center;">**Findings and analysis**</p>

Introduction

This section includes an analysis of the results of the citation analysis, the survey, and the interviews. The results of the three methods will be triangulated and discussed in further detail.

Citation analysis

Introduction

The results of the citation analysis were analysed by year, document type, publication and overall availability in the collection.

(1) By year

The following attributes of the references were noted for analysis:

- Years
- Number of references for those years
- Number of those references available in the library
- Number of those references not available in the library
- Number of references available open access if not in the library
- Number of unavailable references (i.e. neither available in the library, or open access)
- Percentage of unavailability

The percentage of unavailability tells us the percentage of references that the user could not find either in the library or through open access resources. This is considered an unmet need since the user would have to rely on personal resources to get it.

Table 1

References by decade

Years	Number of references	Number of references	Number of references	If not available	Number of unavailabl	% of unavailabil

		available in the library	not available in the library	in the library, how many available open access?	e references	ity
2010-2018	245	169	80	50	30	12.2%
2000-2009	154	133	21	13	8	5.2%
1990-1999	54	40	14	8	6	11.1%
1980-1989	27	19	8	0	8	3.0%
1970-1979	14	10	4	0	4	28.6%
1960-1969	2	2	0	NA	0	0%
1950-1959	2	2	0	NA	0	0%
1940-1949	2	2	0	NA	0	0%

Figure 2

Total references and available references
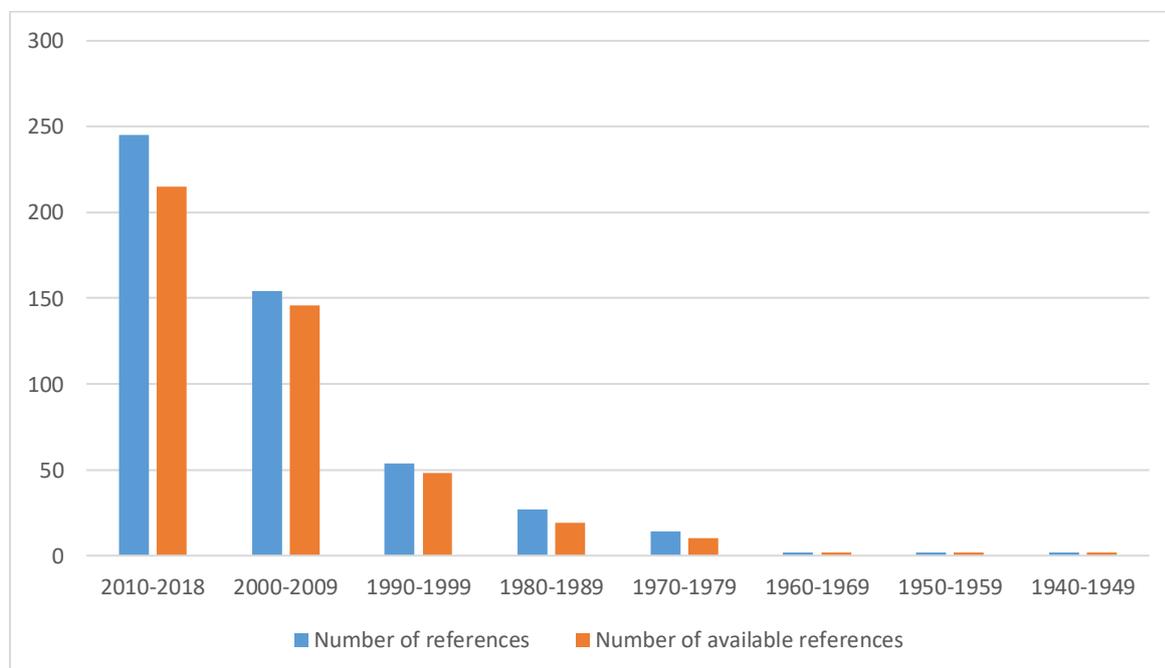
The majority of the resources were cited in the 2010s (49%), followed by those cited in the noughties (30.8%). This is to be expected given that most users would cite resources that were relatively recent (Sylvia, 1998).

Interestingly, the most cited references were from the years 2014 (8.6%), 2015 (7.6%), and 2013 (6.4%), and not 2017 or 2018. This could be an anomaly, or the research for 2017-2018 publications could have been on topics that happened prior to the later dates. However, more studies have to be done to find out if this was the case.

Nevertheless, the overall trend was that SMU users preferred relatively recent resources from the 2010s, and were less likely to use resources before that, and especially before the 2000s.This citing preference was also affirmed in the interviews, where users expressed a preference for more recent publications.

The references that had the highest percentage of unavailability were from the years before the 2000s. Given that SMU was founded in 2000, and its focus at that time would have been on acquiring up-to-date rather than historical resources, it is to be

expected. It was also noted with interest that references from the years 2010, 2011, 2012, 2014 and 2016 had unavailability percentages above 10%. However, all things considered, this was not a large percentage, as over 80% of the references from those years were still available to users.

The unavailability rate for resources from the 1970s was the highest, given the low demand for such resources and SMU's PDAA. While the unavailability rates for the other years before the 1970s remained low, the sample size for those years remains small. The results therefore cannot be generalised to the greater population.

(2) By document type

The following attributes were noted for analysis:

- Document type
- Number of references for each document type
- Number of those references available in the library
- Number of those references not available in the library
- Number of references available open access if not in the library
- Number of unavailable references (i.e. neither available in the library, or open access)
- Percentage of unavailability

Table 2

References by document type

Document type	Number of references	Number of references available in the library	Number of references not available in the library	Out of those not available in the library, how many available open access?	Number of unavailable resources	% of unavailability

Review	26	23	3	2	1	3.8%
Note	1	1	0	NA	0	0%
Editorial	1	0	1	0	1	100%
Conference Paper	92	59	33	27	6	6.5%
Book chapter	2	1	1	1	0	0%
Book	8	7	1	0	1	12.5%
Article	370	286	84	43	41	11.1%

Figure 3

Total references and available references (document type)
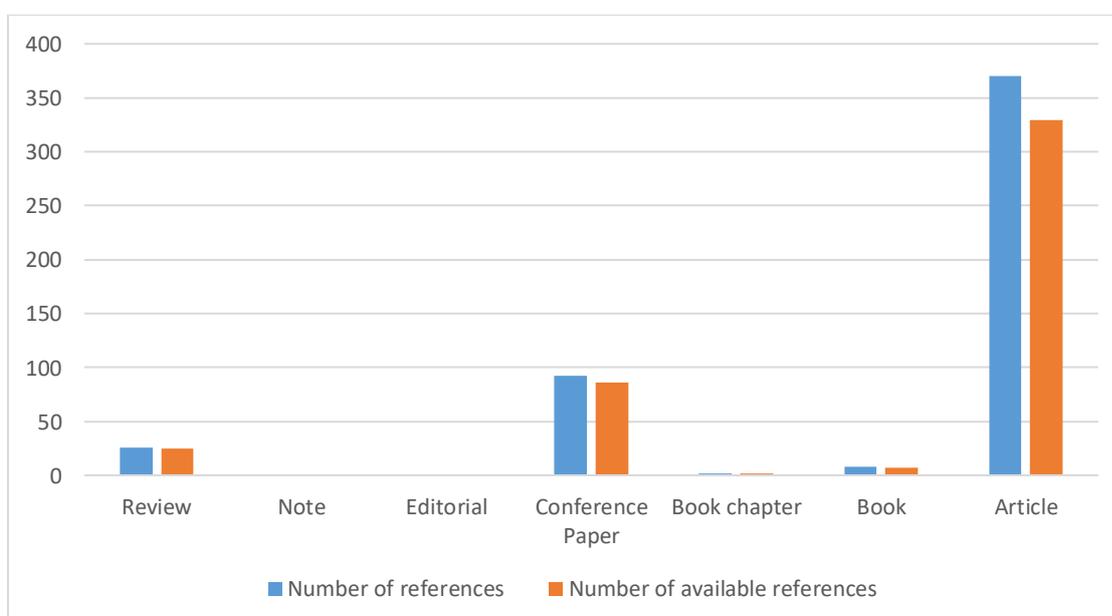
Most of the resources cited were articles (74%), followed by conference papers (18.4%), and reviews (5.2%). This is in line with existing studies, where journal

articles are typically the most highly cited sources (Eckel, 2009). One qualification is that Scopus predominantly indexes articles so the results may reflect this accordingly. However, articles were also the main document type mentioned by users in the interviews.

Interestingly, books have not been very well cited in prior studies (Yang & Meho, 2006) and this trend was also reflected here. This could be because journal articles tend to cover more specific topics of relevance to SMU users' research publications. Alternatively, users may have just found it easier to find relevant articles than books. As will be covered in the interviews, users mostly used Google and Google Scholar to research, the latter being especially helpful for locating free full-text articles (Jamali & Nabavi, 2015).

The unavailability rates for articles, conference papers, reviews and books were low at below 15% each, meaning that over 85% of each resource could be found within the collection or in open access resources.

For notes, editorials and book chapters, the number of references cited were very few at 1 or 2 each. This resulted in unavailability rates of 0% or 100%, which cannot really be properly generalised to the entire population.

(3) By source title/publication

The publication for each resource was noted and compiled to identify the most cited publications.

There were 9 publications that were cited 4 or more times, including:

Table 3

References by publication

Publication	Number of references
Lecture Notes in Computer Science including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics	15

Academy of Management Review	9
Journal of Personality and Social Psychology	7
Journal of Applied Psychology	6
Journal of Finance	5
Organization Studies	5
Strategic Management Journal	4
Journal of Financial Economics	4
Journal of Consumer Research	4

These publications were all available in the library. Interestingly, one resource from the Lecture Notes in Computer Science including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics was not available within the library collection or available open access. This could be because of a lack of coverage for that specific year.

The number of times each publication was cited was further input into SPSS for analysis.

Figure 4

Breakdown of references by publication

Number of references

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	325	83.8	83.8	83.8
	2	40	10.3	10.3	94.1
	3	15	3.9	3.9	97.9
	4	3	.8	.8	98.7
	5	2	.5	.5	99.2
	6	1	.3	.3	99.5
	7	1	.3	.3	99.7
	15	1	.3	.3	100.0
	Total	388	100.0	100.0	

325 publications were referenced once, 40 publications were referenced twice, 13 publications were referenced thrice, and so on.

According to the 80/20 rule, 80 percent of the cited resources can be found in 20 percent of the cited journals (White, 2019, p. 80). This rule did not apply in SMU's context, with the 500 references coming from a total of 388 unique publications. Here, publications that were only cited once accounted for about 83.8% of the cited references, while publications which were cited more than once accounted for 16.2% of the cited references. Therefore, SMU users used a wide spread of publications when conducting their research, meaning that users were not particular about citing from any specific publication. This proposition was also supported by the interviews, where the participants indicated that their main consideration was not the publication, but whether the resource was relevant to their research.

(4) Availability in the library collection

Table 4

Availability in the collection

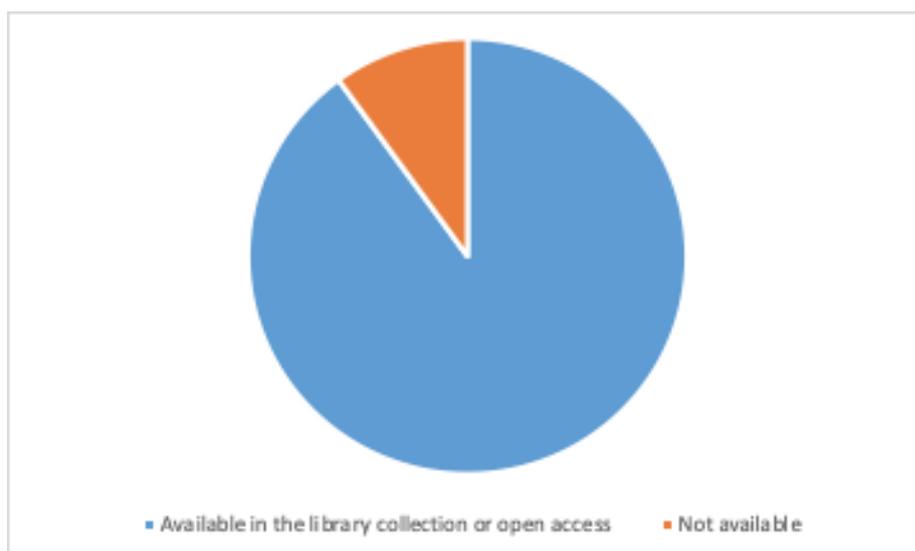| Available in the library collection?	Number of references
Yes	377
No	123

Table 5

Availability open access, if not in the collection

Available open access if not in the library collection?	Number of references
Yes	73
No	50

Figure 5

Overall availability of resources

377 (75.4%) resources were available within the library collection. Out of the 123 (24.6%) that were not, 73 (14.6%) were available open access. Hence, out of all the resources cited, 90% were available in the library or on open access resources.

**Library Service Quality Survey**

Introduction

The survey asked a wide range of questions about the library resources and services offered. The questions assessing user satisfaction with the collection were selected for analysis, with the gaps between the performance and importance ratings being calculated, with 1 being the lowest score and 7 being the highest. A large gap indicated inadequate performance, a performance rating being higher than the importance rating indicated good performance, and a small gap indicated adequate performance.

Analysis

1. The Library anticipates my learning and research needs

Figure 6

The library anticipates my learning and research needs
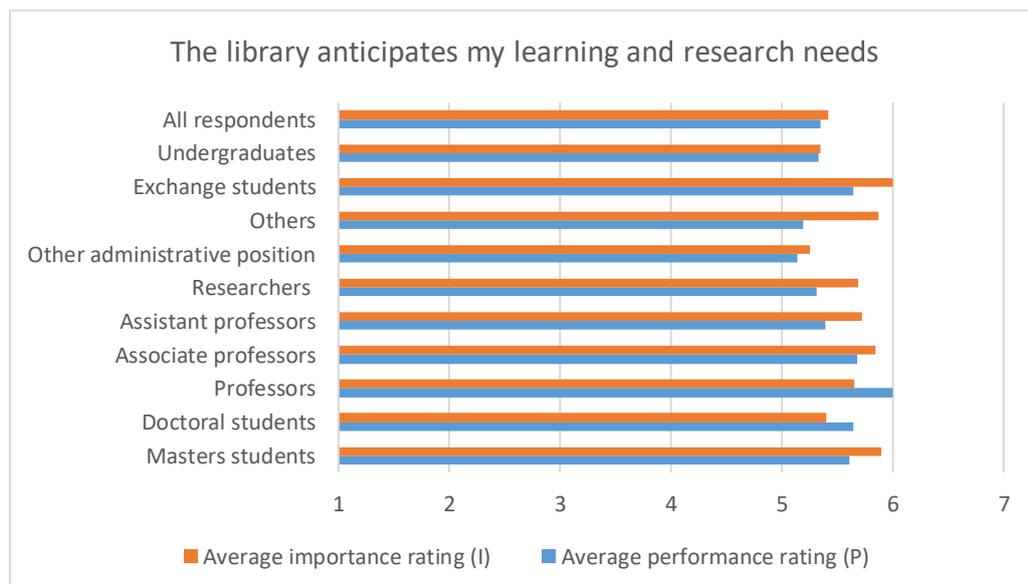
The gap was the largest for others, researchers and exchange students. The performance rating surpassed the importance rating for the professors and doctoral students, and the gap was small for the undergraduates.

Library staff mostly interact with faculty and students, and not the other demographics. Since they seldom interact, it is likely that the library was unable to anticipate their needs as effectively.

Faculty members are oriented when they join SMU, and know they can make acquisitions requests in advance where necessary. Their opinion has also been recognised as a crucial factor in collection development in previous studies (Oseghale, 2008) and the librarians actively engage with them when making acquisitions decisions. It therefore makes sense that the library was able to anticipate their research needs better.

Since faculty are crucial in developing the curriculum (Oseghale, 2008), them working closely with the librarians in building the collection explains why the undergraduates were satisfied in this regard. The doctoral students in SMU also work quite closely with assigned librarians and were likely to be familiar with library services, including making acquisitions requests.

Interestingly, there was quite a large gap for the masters' students. In the interviews, it will be seen that many masters' students were unfamiliar with the library resources and services, which means that they may not know they are able to request titles and express their research needs to the library. Postgraduate students conduct more self-directed research than undergraduates, and their needs may not be adequately covered by all the course readings. Since SMU Libraries adopts a PDAA, and not a "just-in-case" model, where resources were purchased in anticipation of users' future needs (Hodges et al., 2010), this could explain why they felt the library was not able to anticipate their needs.

However, the overall gap of -0.07 for all respondents remains quite small, which means that the library was generally meeting users' needs.

2. Information resources located in the library (e.g. books, journals, DVDs) meet my learning and information needs.

Figure 7

Information resources located in the library meet my learning and information needs

Information resources located in the library meet my learning and information needs.
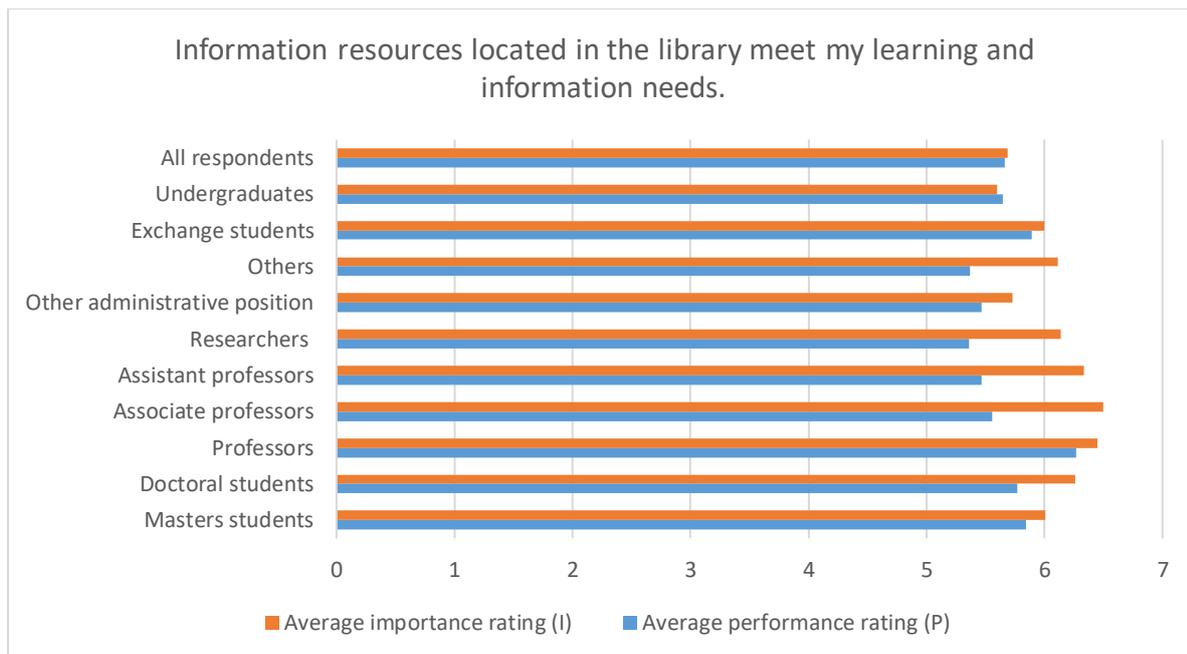
The gap was the largest for the associate professors, assistant professors and researchers. The performance rating surpassed the importance rating for the undergraduates, and the gap was small for the masters and exchange students.
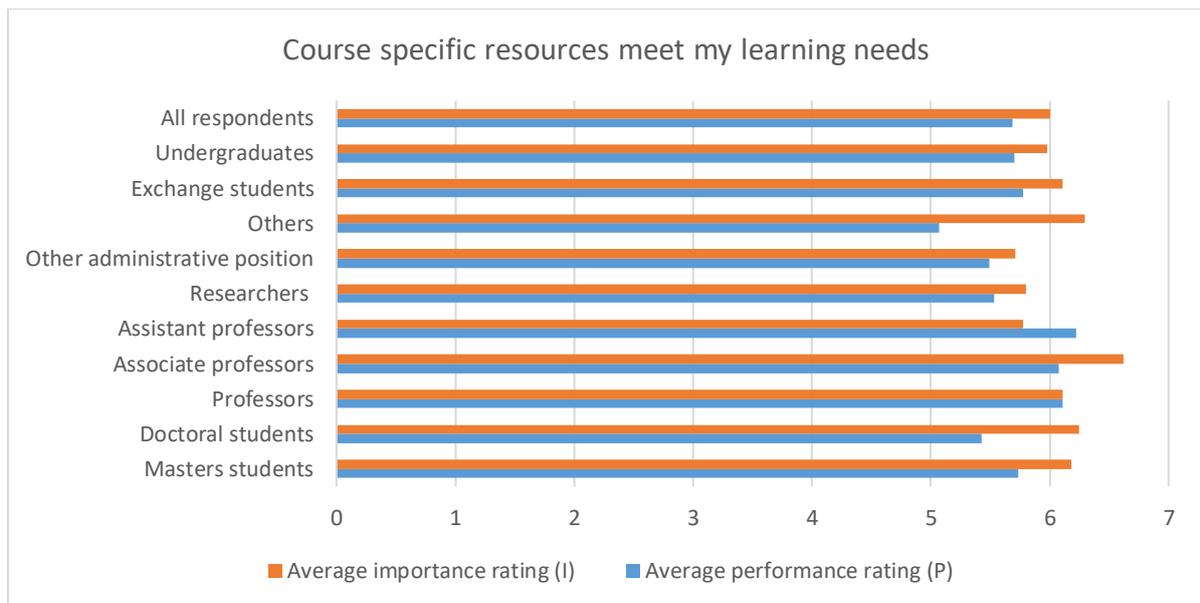
The fact that the worst faring demographics tended to undertake intensive research and publish is interesting, especially in comparison with the citation analysis study, which showed that 90% of the cited resources could be found in the library collection or open access. This may mean that the effectiveness of the library collection could have been inflated by the citation analysis, perhaps because not all resources consulted by the users were actually cited (White, 2019). Alternatively, users could have cited what was already available in the collection rather than what they actually needed (Haycock, 2004).

However, the overall gap of -0.03 for all respondents is still quite small.

3. Course specific resources (online and the reserve collection) meet my learning needs.

Figure 8

Course specific resources meet my learning needs

Course specific resources meet my learning needs

Demographic	Average importance rating (I)	Average performance rating (P)
All respondents	6.0	5.7
Undergraduates	6.0	5.7
Exchange students	6.1	5.8
Others	6.3	5.1
Other administrative position	5.7	5.5
Researchers	5.8	5.5
Assistant professors	5.8	6.2
Associate professors	6.6	6.1
Professors	6.1	6.1
Doctoral students	6.3	5.4
Masters students	6.2	5.7

The gap was largest for others, doctoral students and associate professors. The performance rating was the same as the importance rating for assistant professors.

The overall gap of -0.31 was quite large, which meant that the library has room to improve in this area.

The others demographic fared poorly. As previously mentioned, it is recognised that library staff interact mostly with faculty and students. The others may therefore be less familiar with library resources and services. They may not know that they can request titles or interlibrary loans, or may not know where to find the resources they need.

Another reason why the overall gap was large was due to the importance ratings being generally high, meaning that the performance rating would have to be higher to meet users' expectations. This trend was observed in Christie, Pollitz, and Middleton's study, where more than half of the students who used course reserves felt that this service was crucial in supporting their success at the university, especially given the high cost of textbooks (Christie et al., 2009). There were also suggestions that all required textbooks should be on course reserves, with multiple copies available (Christie et al., 2009).Although Christie's research pertained to students, the value of course specific resources would naturally be high to other demographics in a university as well, including faculty whose key task is to ensure student learning. In fact, associate professors rated this the highest of all demographics, which could explain why the gap was larger.

In SMU, the course specific resources are usually located in the course reserve section of the library. One possibility for lower satisfaction rates relates to the fact that users might prefer course specific resources in electronic format, a point which was raised by an interviewee. Another possibility was that there were insufficient copies of the course reserve titles, or that such titles were not present in the collection at all.

4. Access to Library Information resources has helped me to be successful at university.

Figure 9

Access to library information resources has helped me to be successful at university
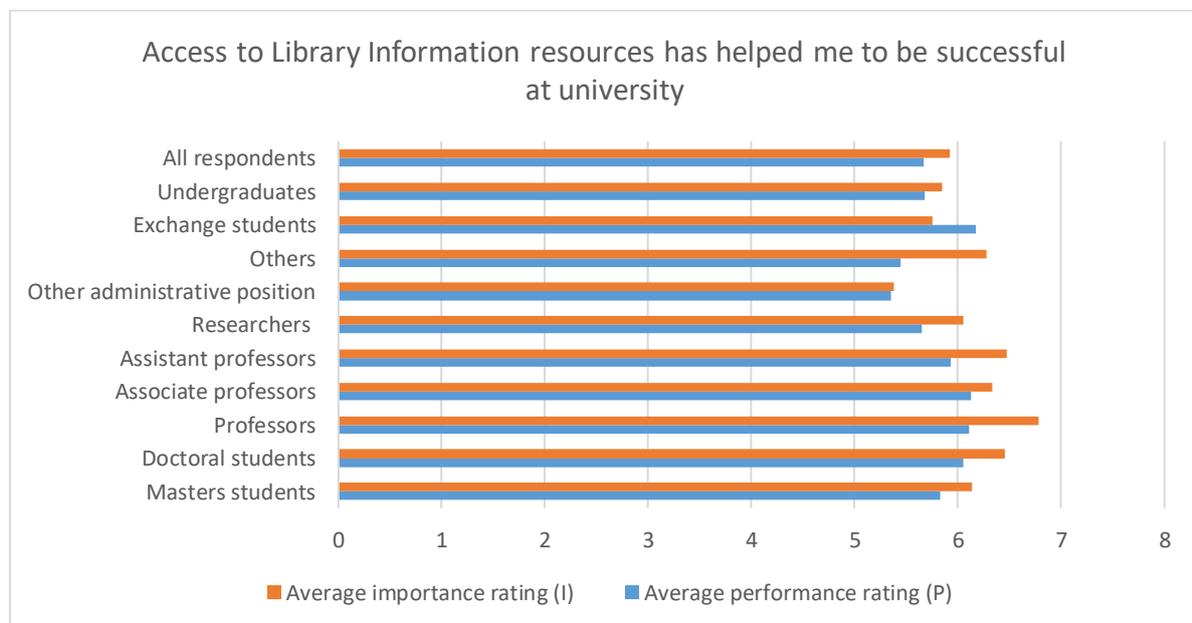
The gap was the largest for the others, professors and assistant professors.

There was an overall gap of -0.25, and this was a potential area of improvement.

Once again, the others demographic scores were poorer, most likely because of a lack of interaction with library staff, together with weaker knowledge of the library resources and services.

However, the citation analysis, which is more relevant for faculty and researchers, showed that 90% of the resources were available in the collection or on open access resources, thereby contradicting the above results. The citation analysis may have perhaps overestimated the effectiveness of the collection, and these results show

that users might not have had access to the relevant information resources they needed.

Several interviewees also indicated that they were not familiar with using the library search facility available online, thereby hindering their ability to effectively search for and retrieve appropriate sources of information.

Additionally, several interviewees indicated a preference for Google and Google Scholar in getting the resources they required, thereby reducing their need to use library resources. This has been recognised as one of the key challenges in librarianship. As library users now have various options for the resources they can use, libraries need to compete in order to encourage users to engage with their own resources (Cullen, 2001).

5. The items I'm looking for on the library shelves are usually there.

Figure 10

The items I'm looking for on the library shelves are usually there

The items I'm looking for on the library shelves are usually there
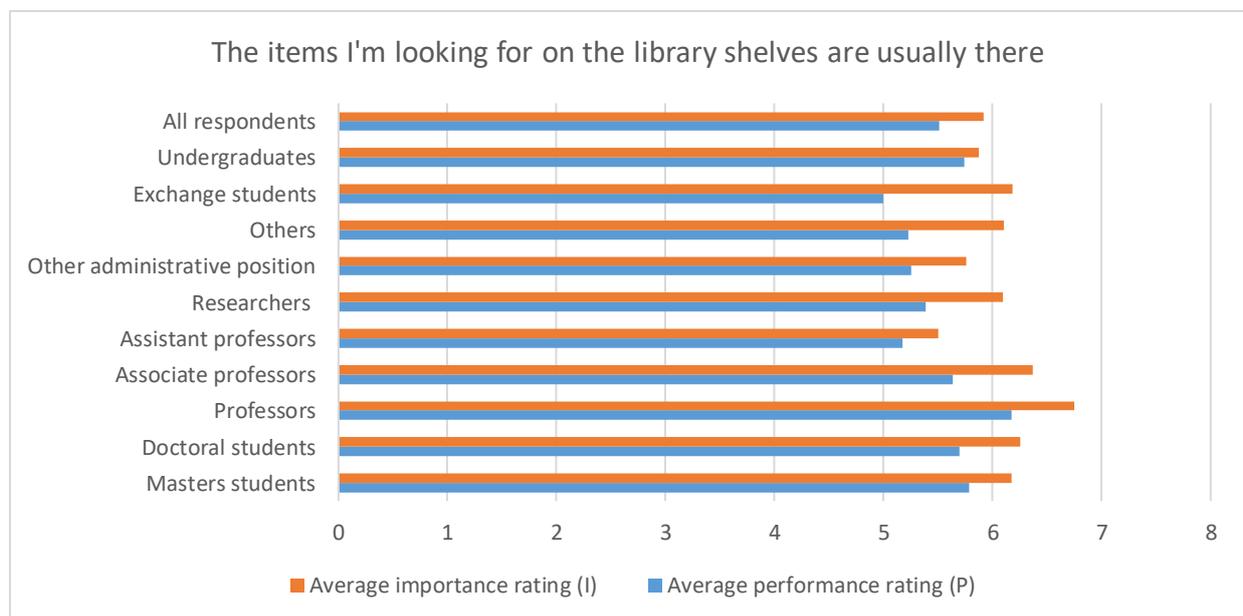
The gap was the largest for the others, exchange students and other administrative position staff. The gap was the smallest for the undergraduates.

There was an overall gap of -0.41 for all respondents, which showed a considerable gap between users' expectations and the actual performance of the library.

One possible reason the exchange students' ratings fared poorly in this regard could be because they were less familiar with the library spaces, and how to locate the resources they needed. This is especially the case when considering their gap (1.18) with that of the undergraduates (0.13). Exchange students join SMU at undergraduate level and the resources they use would be comparable with the local undergraduate students. However, the latter was more successful in finding the resources that they needed. The same rationale could apply for the others and administrative staff demographics, since they were less likely to spend time in the library and using its resources.

Another possibility was that the items were not located on their assigned shelves. This could be because users were browsing the items without borrowing them, or the items had been wrongly shelved. If this was the case, then the difference in scores between the undergraduates and the exchange students would suggest that the undergraduates were more satisfied in this aspect nonetheless. This further suggests that undergraduates could be locating the resources they needed through alternative methods (e.g. purchasing their own books, relying on Google).

Postgraduate and undergraduate interviews

Introduction

As part of the research, 3 PGs and 3 UGs were interviewed. A set of questions were asked and the participants were allowed to answer freely in their own words.

Analysis

1. Main resources used when researching

All users, except for the law UG, identified Google as a main resource. The library search (the online search tool used by library service) was also identified by (5 participants) as a main resource although Google was generally preferred for its better search function (1 UG) or due to the user's familiarity with the interface (1 PG). The accountancy UG explained that she would "only use the library search box if [she feels she needs] more professional looking citations". 1 PG did not even know about the library search box.

Passport (Euromonitor International, n.d.), a business database, was also evidently a key resource for the MIM programme as all PGs identified this as a main resource.

It is evident that Google and Library Search are the key tools used for searching for information, however most users preferred Google over library search. Studies have shown that users rely on Google because of the perceived complexity of library resources, and the efficiency and ease-of-use of Google (Brophy & Bawden, 2005).

2. Main document types used for researching

Journal articles are predominantly the main document preferred by participants for their research, followed by books, and a much lesser extent, blog posts, websites and databases.

This result tallies with the citation analysis study, where articles were overwhelmingly the most cited resource (74%). However, the second most cited resource according to the citation study was conference papers, not books. This anomaly may be due to the fact that books are not well indexed in Scopus in comparison to conference papers (Elsevier, 2020). Also Scopus largely reflects the works of faculty and researchers, therefore user groups here may have different information behaviour. The participants may also have found more relevant journal articles than other document types, which makes sense if they use Google, which has more free articles than other resource types.

The interviewees did not have a core journal they preferred. Instead, their emphasis was on the resource's relevance to the topic, or ability to support their argument. This finding is affirmed by the citation analysis.

These results are also supported by the proposition that users tend to cite what is relevant, and what can persuade the readers (Brooks, 1985; Smith, 1981). Their main consideration when looking for resources would therefore be the content and relevance of the resources, and not necessarily the publication.

3. Currency of sources used

Most of the participants preferred to use the most recent (less than 5 years old) sources for their research, although they appreciated that for some topics this wasn't always possible. One UG explained, "I try … not to extend past 5 years ago, unless

the issue that I am finding for is for example a case that was closed 10 years ago and has no further updates…"

The citation analysis demonstrated that users preferred recent material, although less recent perhaps that indicated in interviews with resources from the 2010s and 2000s being popular in usage.

4. Retrieval of appropriate sources

Participants provided a range of experiences here, with most reporting that they were able to find most of what they were looking for in terms of their research. Most participants used Google as their primary search tool, and it was apparent that the Library search tool caused confusion for some participants.

The remaining participants did not use the library search often and could not comment.

Participants highlighted having difficulty finding certain resources, including old legal cases, new legal articles and marketing journals.

Interestingly, SMU does have many marketing journals, suggesting that a lack of awareness of library resources may have prevented discovery. In fact, several participants acknowledged that unfamiliarity with the library search may have prevented them from finding the resources they were looking for.

Where the participants were unable to find the resources they needed, most would rely on external resources. Other courses of action included changing the argument, or crafting the proposition personally without relying on cited materials. None of the users indicated that they would try and find an alternative resource in the library collection even though it contains a lot of resources.

This result reiterates users' general preference for Google over library resources, which could be due to them finding the library search complex or ineffective and Google easier to use.

5. Areas of improvement

There was consensus that the library offered a wide range of valuable, relevant, accessible, and reliable resources. However, weaknesses identified were that the

library search tool was not easy to use, and users needed to know where to go to find the information they needed.

The challenges of using the library search tool, meant that participants preferred using Google as a search tool. Google can provide a large volume of information quickly, which has also lead to the belief that all information can be easily found there, and a subsequent dismissal of library resources, which users often deem as complex (Brophy & Bawden, 2005).

As observed by Mostafa, internet search engines have vastly changed how people conduct their research. They are no longer dependent on the library, but can easily retrieve the information needed using Google, which is now the prominent way of doing research. (2005).

Suggestions for improvement included raising awareness about the library search and how to use it through instruction improving the effectiveness of the library search, having certain functions made more prominent (e.g. BrowZine function), and having more electronic resources.

It has already been mentioned that users found the library search tool difficult to use and library resources hard to navigate, with several participants not able to use library search or even knowing about it. This tallies with previous studies that have established students' lack of familiarity with library resources, and performing library search tasks (Krueger et al., 2004).

The suggestion for more electronic resources, especially for textbooks by 1 UG because "[it is] easy to refer to" also reflects the growing preference for electronic resources (Bar-Ilan & Fink, 2005). Studies have shown that users prefer electronic resources because they are easily accessible from anywhere, and can also link to other resources such as through hyperlinks (Bar-Ilan & Fink, 2005).

6. Meeting user needs

All participants said they were satisfied with the library collection, and most shared that the library collection was able to meet their needs. However, several participants indicated they did not use the library much, and one participant preferred for there to be more electronic resources.

As explained earlier, a majority of the participants used Google as a primary resource, and library search as a supplementary resource. However, the combination of Google and library resources is subjectively perceived to be sufficient in meeting the participants' needs. This is an interesting observation. A helpful feature of Google is its ability to link to library resources, and studies have shown that it is able to provide a larger number of relevant documents than library resources (Brophy & Bawden, 2005). That being said, library resources are able to provide a higher number of good quality results (Brophy & Bawden, 2005). Hence, while using Google primarily may be able to adequately support the users' research and learning needs, these needs could potentially be better met by library resources.

A holistic analysis: Triangulating the results

Each method provided useful insights, especially when analysed holistically with the others. This section will focus on the main observations from the study.

Users generally get the resources they need but a lack of familiarity is an obstacle in using library resources

In the citation analysis, 90% of the cited resources were available within the library collection or available open access, suggesting that the collection was largely able to meet users' needs.

Interestingly, the results from the survey differed, as course specific resources and access to library information resources were identified as areas of improvement. This showed that users may not actually be getting the resources they need and that the citation analysis may have been inflating the effectiveness of the collection if the users tended to use what was already available.

This insight was affirmed in the interviews where participants shared that not being able to get the resources needed could be due to a lack of awareness of the resources or how to use them effectively. In light of this, many participants preferred to use Google, likely due to its ease of use and ability to retrieve many relevant results. Many users also felt that the materials they needed could be found on Google anyway, which reduced their need to rely on library resources.

Relevance is the key consideration

According to Smith, users cite the best works available that are relevant to their current research (1981). Brooks further explained that people cite certain resources to justify their arguments or persuade the reader (1985).

The most well-cited document type in the citation analysis was articles, followed by conference papers and reviews and the unavailability rates for these documents types were low. In line with Smith and Brooks' observations, users are likely to cite resources they find relevant, and are able to justify their arguments. Articles tend to cover specific topics and it is possible they were relevant to SMU users' research publications that tend to be quite specific.

The interviews affirmed the citation analysis that journal articles were the main document type used. This may be because the participants' main consideration when citing resources is their relevance to their topic, and they were able to find more journal articles relevant to their topic. This is also likely because they mainly use Google, which has more free articles than other document types. This observation is also in line with prior studies (Eckel, 2009).

Books were not one of the main resource types used. In addition to there being fewer free books on Google compared to articles, it was possible that the number of books cited may have been underestimated due to Scopus indexing fewer such resources.

Current resources are generally preferred

Most of the cited references from the citation analysis were from the 2010s onwards, and these were largely available in the library collection. This is expected assuming SMU users chose to cite the best and most relevant works available to persuade users. Current resources are likelier to be reliable and relevant, and make for a more convincing argument compared to outdated resources. Additionally, since SMU adopts a patrons-driven acquisitions approach and the demand for more current resources would be higher, it is natural that the collection is stronger for current resources.

Users' preference for recent publications was affirmed in the interviews. While 4-5 years old resources was suggested as the limit of being too old in the interview, the citation analysis showed that even resources published up till 2010 were well-cited.

This could mean that while users may subjectively think their limit is 4-5 year old resources, they may actually use resources that are published up to 2010.

As a corollary, users did not cite many resources from before the 2000s, and the collection was also weaker in the 1970s. Unfortunately, the sample size for references from before the 1970s was too small to make any reasonable conclusion but it is conjectured that the collection would be weaker in those time periods as well.

Users are less concerned with the publication

The citation analysis also showed that a wide range of publications was cited by SMU users, and there were no specific "core" publications that were extensively cited. The 80/20 rule hence did not apply in this instance. Based on the assumption that users tend to cite resources they think are relevant, their main consideration could be the relevance of a specific work, rather than the publication it was from. This understanding was affirmed in the interviews, where participants' priority was finding relevant resources, and not to cite from certain core publications.

Users prefer electronic resources

According to the survey, course specific resources and access to library information resources were identified as areas of improvement. While SMU Libraries is an e-preferred library, some titles, including course specific titles, are simply not available electronically. This could potentially explain why there was some dissatisfaction these aspects.

In the interviews as well, there was a preference for electronic resources, especially for textbooks. That many of the textbooks are in print could also explain the lower satisfaction ratings for course-specific reasons in the survey.

Significance to other libraries

While this study took place within the context of SMU, the relevance of the findings go far beyond that.

Students growing preference for Google over library resources is a global trend, and something that concerns libraries around the world. As evinced in this study, many not only find Google easier to use (Brophy and Bawden, 2005), they also believe they are able to find what they need there, reducing or even eliminating the need to

use library resources. This is despite many of them recognizing the value of library resources. If users were more familiar with library resources and how to use them effectively, it is likely that the quality of the research would be enhanced.

The finding that users are less concerned with citing from specific publications than with the relevance of the resources is also a pertinent consideration in building collections. Instead of subscribing to certain publications because they are considered "core", it may be more meaningful to have a deeper understanding of users' current research needs by having regular communications with them. The need to have a strong understanding of users when building collections is well-known (Lee, 2000), and applies in non-academic libraries as well.

Conclusion

This article has sought to address a gap in the research by using a mixed methods approach comprising three qualitative and quantitative methods to holistically evaluate SMU Libraries' collection. Helpful insights were discerned about users' information behaviour, including actual usage of resources, the motivations behind such usage, and the difficulties they had.

One of the main challenges the library faced was a lack of awareness about the library resources, including how to use the library search tool or the library spaces effectively. This, in addition to the perception that Google was easy to use, led many users to rely predominantly on Google when doing research. This was in spite of the fact that library resources could have provided more authoritative and reliable resources.

Moving forward, the library should aim to strengthen its efforts in raising awareness about its resources and spaces.

Previously, the decision to teach students how to use the library search tool was left to the discretion of the individual librarians. However, it is evident that many students could actually benefit from such an introduction, and perhaps this should be made a compulsory component of library classes all students have to undergo.

It was interesting to note that user groups with less favourable experiences with the library resources tended to have less engagement with the librarians. The librarians should aim to enhance their engagement efforts' with these groups, which included international exchange students and staff. Orientation activities could be revamped to include a more in-depth introduction to library spaces and resources, and different user groups can be assigned to allocated librarians so they know who they can contact if they require further assistance.

Given the plethora of wonderful resources the library has to offer, it would be a shame if the users did not fully utilize them. Hopefully, a stronger awareness of what SMU Libraries has to offer would allow the users to harness both library and internet resources, and achieve the most effective outcomes for their education and research.

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