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## ***Evaluating Library Spaces while Developing a 'Culture of Assessment'***

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*To every thing there is a season, and a time to every purpose under heaven*  
**Ecclesiastes [Ecclesiastes 3:1-8](#)**

### **Introduction**

Perceptions about and reality of library spaces as learning spaces have been making considerable impact on the planning, implementation and evaluation of library buildings and spaces in recent times.

Learning spaces throughout campuses in most parts of the world are being reconfigured in response to changing pedagogies incorporating student-centred learning; Rather than the teacher as the 'sage on the stage' approach, there is an increased emphasis on project-based, problem-based, blended learning and flipped classroom approaches. Library spaces are seen increasingly as an extension and integral part of learning spaces, as it is now widely recognised that learning takes place anywhere and anytime, not necessarily in the classroom or lecture theatre alone. Brown (2002) argues that 'learning is a remarkably social process'...'it occurs *not* as a response to teaching, but rather as a result of a social framework that fosters learning'. Libraries provide informal learning spaces where social learning is encouraged. Oblinger's (2006) statement, "Learning is the central activity of colleges and universities. Sometimes that learning occurs in classrooms (formal learning); other times it results from serendipitous interactions among individuals (informal learning)", summarises the interrelationship between formal and informal learning.

The relationship between changing pedagogies and use of learning spaces, including the library as a learning space, rather than being seen solely as a 'repository of books' and a 'study hall', coupled with the changing role of libraries and librarians, have contributed a great deal towards development and growth of a more dynamic and collaborative dialogue amongst librarians and their stakeholders, in particular campus space planners, teaching and learning and technology leaders as well as the academic community. Whilst the paradigm shifts regarding the role and function of libraries and librarians have been occurring gradually, a parallel development has been the growth of 'culture of assessment', demonstration of value and impact, and evidence based decision making amongst libraries.

The paradigm shift taking place in both the theory and practice of teaching and learning, not only in higher education, but more so in secondary education, recognises that the student population is not homogeneous but has become increasingly heterogeneous over the last 20 years. Studies which looked at the relationships between space and learning (Oblinger, 2006), (Crook and Mitchell, 2012) and (Bryant, Matthews and Walton, 2009) state that space use preferences differ widely amongst students depending on a range of factors, such as:

- Personal learning styles

- Learning outcomes as specified in course outlines
- Pedagogy, e.g. flipped classroom, blended learning, project-based learning, requirements for group presentations and so on
- Courses or subjects studied
- Phase or stage of the academic term
- Perceptions of 'being a good student' or 'a social student, i.e. not so hard working?'
- Demographic characteristics

The 2009 Educause study claims that “no one physical structure accommodated all types of learning needs” (Hunley and Schaller 2009). The relationship between pedagogy and use of learning spaces is an evolving one and will continue to change depending on the factors listed above.

### **Purpose**

*'Form follows function'* is a much debated principle for design and architecture associated with modernism in architecture. In library and learning space design, the 'form follows function which must follow vision' approach has been helpful in linking the vision for space to the overall purpose and aim of the existence of the library and its parent institution. Design of library spaces and services has direct correlation with the use of library as a place, not only in terms of frequency, but impact on the success of its users, that is predominantly the students. Faculty tend not to use libraries as physical facilities, but more as a virtual resource and facility due to the exponential increase in the remote availability of scholarly e-resources.

Vision to envisage all learning spaces including those in the library needs to precede the planning, implementation and evaluation stages, so that the form, structure, design, size, shape, expected functions and all other associated elements can take shape accordingly. Bryant, Matthews and Walton's ethnographic study at Loughborough University Library (2009), demonstrates this concept by stating that “We need to start, then, by asking not 'what buildings do we want?' but instead 'what sort of education do we want to see in future?' We need to ask not 'how many classrooms do we need?' but 'what sorts of learning relationships do we want to foster? What competencies do we want learners to develop? What tools and resources are available to us to support learning?”

Hunley and Schaller (2009) in their multi-year study of learning spaces claim that they have discovered relationships among learning space, instructional practices and learning. Their study presents situations that encourage and discourage students with regard to the use of learning space and conclude that academic engagement is encouraged by learning spaces that are 'comfortable, open, flexible and appealing' based on evidence gathered from their study.

The main purpose of this paper is to investigate if the recent space transformation at Li Ka Shing Library met its objectives and whether it had any impact on the students' learning and experience of the library spaces and to assess effectiveness of the space transformation on student and faculty engagement.

To enhance the student learning experience, Li Ka Shing Library staff at Singapore Management University (SMU) collaborated with a wide range of stakeholders to understand their current and future needs and requirements for innovative learning spaces aligned with SMU's pedagogy. They engaged students, faculty, library staff and others in focus groups, interviews and surveys in

consultation with a firm of architects and interior designers with expertise in learning space design. A master planning exercise was carried out in 2012-2013 and renovations took place in 2014. The master planning exercise covered the whole building, but a decision was made to proceed with the transformation in stages, so the first stage involved only 20% of the building. However, spaces chosen for transformation were considered strategic from pedagogic, functional and aesthetic perspectives. The vision for the Library Learning space transformation was developed as:  
*To create a dynamic, flexible, unique, innovative, efficient library/learning space for SMU community.*

The results of this Library Learning Space initiative as of 2014 increased seating capacity and power outlets as well as the creation of a number of new innovative learning spaces including the **Learning Commons (open 24/7)**, the **Learning Labs**, an **Investment Studio**, the **HIVE** (a state of the art teaching space) and a new **Graduate Lounge**, each of which is equipped with innovative technologies and the flexibility to facilitate active learning.

### **Design, methodology & approach**

After the completion of the transformation project, the project team agreed that it was essential to find out whether the project had achieved its objectives, to assess the impact of the change on students’ learning, student and faculty engagement and to communicate the outcomes and impact to the university community. The approach to investigate the outcomes of the space transformation reinforced assessment and management competencies of library staff as a part of the Library’s Culture of Assessment initiative, also initiated in 2012-13. The Library learning spaces evaluation and assessment exercise included utilization of both quantitative and qualitative methods to ascertain ‘voice of the customer’ to demonstrate value and to inform future improvements not only for the Library, but other learning spaces on campus.

The methods included:

- LibQual Survey results for 2013 and 2015
- Sentiment analysis – use of text mining of LibQual survey comments
- People Counters installed at all entrances and exits
- Focus groups with students
- Interviews with and feedback from faculty
- Drop card data to analyse use of the new Learning Commons

The 2013 LibQual survey results had clearly demonstrated that ‘Library as Place’ was below the desired levels of satisfaction. These results, coupled with a range of other feedback from faculty and students, were used to raise awareness and make a case for funding of the 2014 library transformation. LibQual survey results for 2015 as illustrated in the ‘Library as Place’ chart demonstrated that the respondents perceived the renovations as improvement compared to the 2013 results (Table 1).

ID	Question Text	Change	2015 Perceived Mean	2013 Perceived Mean
LP-1	Library space that inspires study and learning	+0.48	7.15	6.67
LP-2	Quiet space for individual	+0.29	7.01	6.72

	activities			
LP-3	A comfortable and inviting location	+0.55	7.38	6.83
LP-4	A getaway for study, learning, or research	+0.27	7.29	7.02
LP-5	Community space for group learning and group study	+0.31	7.20	6.89
Add	A place for reflection and creativity	+0.37	6.43	6.06
	Library as Place Overall SMU (ARL = 6.94)	↑	7.20	6.83

Table 1: LibQual 2013 and 2015 comparison of Library as Place

The 2013 comments were analysed manually but the process proved tedious and did not inform the Library in a systematic way. The need for an automated approach to analyse the textual comments and discover insights such as topics of interest and sentiments of the library users became apparent. Topics of interest can be collections, noise levels etc., and the sentiments can be positive or negative.

An automated text analytics approach was used to categorise the LibQual 2015 comments by topics and extract the sentiments of the comments. Text analytics is a research area that supports mining unstructured data and generates a meaningful representation of the text for decision makers (Aggerwal and Zhai, 2012). More specifically, clustering and opinion mining techniques were used for detecting the topics and sentiments respectively. The outputs were transformed into visuals to help the library for planning and decision making. Details of the approach follow:

Extracting the topics of comments: Clustering involves dividing data into distinct groups such that objects in the same cluster are similar and objects in different clusters are dissimilar (Beil, Ester and Xu, 2002). In the library's context, comments may be considered similar if they contain many overlapping words or phrases. Comments on similar topics exhibit specific characteristics that separate them from comments that focus on other topics. For example, comments on the topic, *library resources* use words such as "books", "textbooks", "reserves" etc. The tool, Cluto (Karypis, 2015) generated clusters of comments. The tool provides the visuals of the clusters and top words in each cluster as shown in Figure 1.

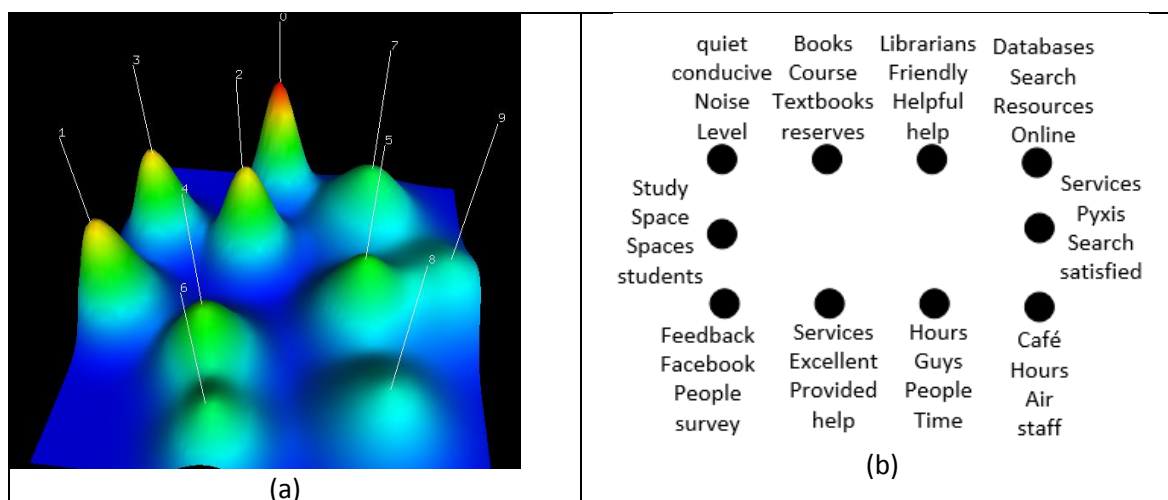


Fig 1: (a) Matrix visualization of clusters generated by Cluto. (b) Top words of each clusters generated by Cluto.

Extracting the sentiments of comments: Sentiment analysis, which is also called opinion mining, involves building a system to collect and examine opinions about a topic or a product (Hu and Liu, 2004). Sentiment extraction is the task of labelling the sentiment of a comment as positive or negative. For example, “Paper books are quite limited and it is really hard to find the recent published edition of books in our library” is a negative comment on *book collection* whereas, “The course reserve helps me to save money from buying textbooks. Thank you!” is a positive comment.

A library feedback system was developed that integrated Cluto and sentiment extraction algorithms to generate the visuals. Figure 2 shows sample comments and the visuals of sentiments extracted by the tool.

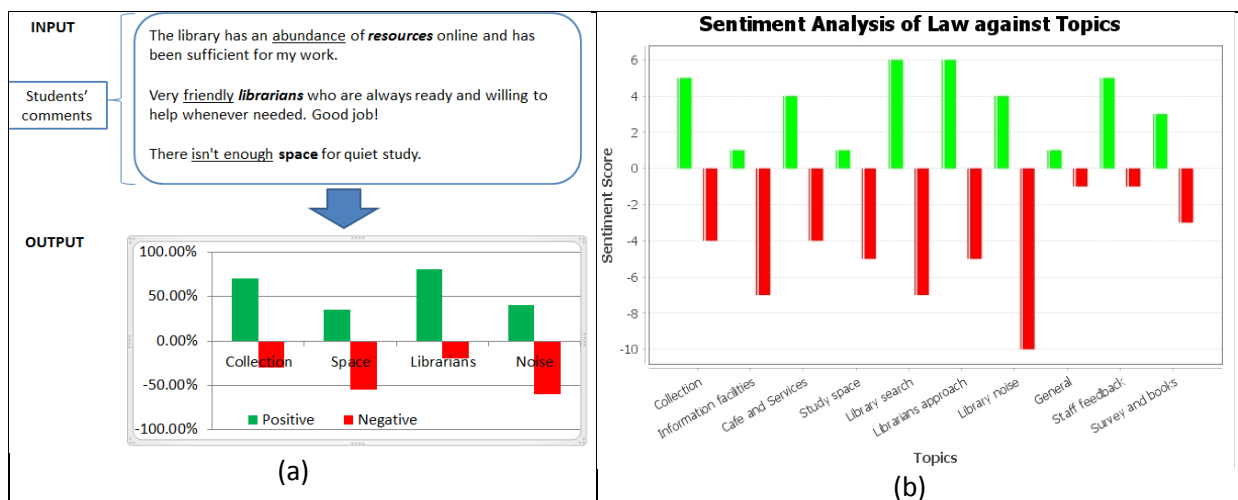


Fig 2: (a) Example comments from library users as input and sentiment classification visuals by topics. (b) Sentiment analysis of Law school users about the library generated by the system.

Two separate focus group discussions with undergraduate students were facilitated and focused on the 24/7 Learning Commons area. The purpose of the focus groups was to gather feedback from the students regarding the following outcomes:

1. To understand, from the student’s perspective, how ‘academic learning success’ is defined
2. To understand how the learning spaces (the physical environment, furnishings, technology, etc.) contribute to the students’ academic learning success
3. To understand how students decide which type of learning space is most appropriate for a given learning activity (e.g., open spaces, carrels, benches, project rooms, etc.)
4. To understand how students engage with the space/facilities in the Library

Drop cards were distributed to students using the Learning Commons space on three different days at different times of the day. The objectives of using the drop card method were to understand students’ patterns of use, perceptions and assumptions about the space and their aspirations for different experiences in the designated space.

Ninety drop cards were distributed and 67 were returned completed. Students were asked to comment on:

- Activities for the past 1-3 hours
- Most preferred areas

- Aspects of space most important to them
- Projects/courses they are working on
- Any perceived unmet needs

Faculty interviews investigated how the new student spaces and flexible teaching areas contributed to student learning. Qualitative comments from the faculty were analysed and used as input for both immediate improvements and for future planning purposes.

## Findings

The outcomes of both the quantitative and qualitative analysis confirmed that objectives of master planning and renovations were met as related to increased seating capacity, creation of a variety of enhanced learning spaces, shareable technology, additional power outlets, new flexible teaching and learning spaces and a 24/7 Learning Commons by reducing unused spaces, maximising use of existing spaces, combining various service desks, bringing all staff together in one area and creating a welcoming entrance. The 2015 LibQual perceived mean of 'Library as Place' dimension had increased 38 percent following the 2013 survey (See Table 1).

The use of People Counters installed at the entrance and exit of the 24/7 Learning Commons confirmed popularity of the Learning Commons from midnight to 8:00 am when the Library opens.

The qualitative methods (faculty interviews, focus groups, drop card results and LibQual free text analysis) supported findings of the literature (Crook and Mitchell, 2012; Cha and Kim, 2015) and provided insight into student and faculty perceptions of the space transformations as well as informing the Library regarding ongoing improvements and the means to demonstrate value to stakeholders.

While faculty use of the new flexible teaching and learning spaces (Learning Labs and the HIVE) is limited, comments from those using the space include: 'A room with moveable furniture, not bound by structure allows for a more relaxed atmosphere... Students can sit close together creating a friendlier environment...' The comments reflect the findings of Hunley and Schaller (2009) that confirm 'engagement is encouraged by learning spaces that are comfortable, flexible and appealing'.

The focus group sessions with undergraduate students also support the literature regarding a wide variety of factors influencing choice of learning spaces (Cha and Kim, 2015) as reflected in Table 2 below:

Focus Group Questions	A selection of responses
<b>What does 'learning success' mean to you?</b>	<p>"The most effective students have consistent habits. They are likely to be seat-hoggers as they come in early, choose a spot that works for them and establish their routine."</p> <ul style="list-style-type: none"> <li>• Options for different types of work</li> <li>• Spaces conducive for retention</li> <li>• Spaces for quiet study or discussion</li> <li>• No distractions</li> </ul>
<b>How do learning spaces (the physical environment, furnishings, technology, etc.)</b>	<p>"The library provides an area to study, a quiet place, not so much for discussion. Collaborative</p>

<b>contribute to the student's academic learning success</b>	discussions can be taken out of the library; prefer quiet. Notion of a library is that it is a quiet area... collaborative areas are not helpful for those that want to study.” <ul style="list-style-type: none"> <li>• Abundance of power points</li> <li>• Seat hogging to claim space</li> <li>• Personal study for exam time</li> <li>• Collaborative study for term [project] time</li> </ul>
<b>How do you decide where to sit?</b>	“Depends on the objective—if I’m studying something I don’t really understand, then I will want to be near someone that I can ask questions of. But, if it’s something requiring serious study, I’ll have strangers all around me so that I don’t get distracted.”

Table 2: Focus Group questions and results

<b>Drop Card Questions</b>	<b>Results</b>
<b>Activities for the past 1-3 hours:</b>	<ul style="list-style-type: none"> <li>• 42% studying on my own</li> <li>• 36% studying with 1 person</li> <li>• 32% studying with 2 people</li> <li>• 12% watching a movie</li> <li>• 25% working on a group project</li> <li>• 16% socializing</li> </ul>
<b>Most preferred areas:</b>	<ul style="list-style-type: none"> <li>• 39% group study tables</li> <li>• 31% study booths</li> <li>• 25% individual carrels</li> <li>• 31% benches overlooking campus green</li> <li>• 20% project rooms</li> <li>• 13% Hive space w/flexible tables and shareable technology</li> </ul>
<b>Aspects most important to you:</b>	<ul style="list-style-type: none"> <li>• 59% 24/7 Learning Commons</li> <li>• 26% project rooms</li> <li>• 36% furniture</li> <li>• 23% collaborative design</li> <li>• 21% security and safety</li> </ul>

Table 3: Drop Card questions and results

The preliminary results of the LibQual 2015 automated sentiment analysis of the comments confirm that Social Sciences and Law students are majorly concerned with the noise aspects. Accountancy, Economics, Business and Information Systems students are concerned with study space. However, Law and Business students are happy with the collection and the search facilities. Students from all schools are generally satisfied with the librarians and the feedback aspects. Therefore, there is a need to focus on improving the search facilities, information resources for specific areas, and focus on the study spaces suitable for specific school needs.

## Discussion

One year following the renovation of learning spaces in the Li Ka Shing Library, one of the meaningful outcomes of the parallel initiatives (Culture of Assessment and Learning Space



Assessment), has been the increased level of engagement between librarians, students and faculty as evidenced by a number of collaborative initiatives between library staff and faculty and students to achieve outcomes for learning, teaching and other campus wide activities. The campus-wide discussions around the importance of learning spaces that contribute to the University's teaching and learning goals, have helped shift the perception of the library from being seen primarily as a 'repository of books and study hall' to one of active participants in teaching, learning, research and community activities.

Changing perceptions about the role of the Library in relation to learning spaces coupled with the Library's involvement in two major SMU President-led initiatives to enhance cross departmental collaboration, operational efficiency and transparency and optimum utilisation of campus spaces: 'Business Process Improvement' (BPI) and 'Responsibility Centred Accounting' (RCA) has been instrumental in facilitating both internal and external recognition of librarians' role as active partners with faculty and campus decision makers.

Prior to the space transformation, the library building was opened 24/7 twice a year for 3-4 weeks before and during the examination period. As a result of the creation of a 24/7 Learning Commons with separate air-conditioning, this practice ceased, resulting in significant savings in utilities costs.

Staff space (659 sqm) was repurposed to create additional student seating and learning spaces. Service desks were combined, leading to a new service model and enhanced collaboration amongst library teams as part of the change management strategy for improved service quality and alignment of staff resources with the changing roles of librarians. The new service model being trialled involves an escalation and tiered approach with increased competency building amongst staff and redirecting of staff resources to priority areas, such as increased faculty and research engagement.

The ongoing analysis of quantitative and qualitative data informs new library initiatives, such as the new Kwa Geok Choo Law Library scheduled to open in early 2017, a number of librarian/faculty partnerships involving curriculum integrated information literacy activities, and so on. The resulting higher levels of staff engagement, empowerment and involvement have extended to new student and faculty partnerships from the students and librarians researching 'seat hogging' behaviours in the library (Wen et al., 2015) to a new collaboration between the Library and SMU's LiveLabs, gathering dynamic location data via student devices (laptops) and the campus WiFi, to show hourly occupancy of different areas of the Library during the course of the day as well as student movement throughout the Library and to and from the Library around campus.

## **Conclusion**

This study using a number of different quantitative and qualitative techniques, such as LibQual benchmarking survey results over two different periods, sentiment analysis using text mining, focus groups, drop card method, faculty interviews, suggestion box responses and gate count analysis over a 3 year period has demonstrated that learning spaces in Li Ka Shing Library are used in different ways by students depending on the types of pedagogies, their individual learning preferences, level of focus and ambition for success, phase of the academic year and the course they are undertaking.

Triangulation of findings using a variety of methods over a number of years has shown that such assessment and analysis activities need to be carried out on an on-going basis to ensure learning

spaces remain relevant and dynamic to the changing needs and requirements of the campus. Space assessment has become an ongoing activity for the Library, and therefore a process to gather continuous feedback from the students and the faculty using the spaces and also observations of how they use the space is now been built into the Library's assessment plan. As part of the Library's Culture of Assessment strategy, findings are used as and when appropriate to increase awareness about the Library's impact and contributions to the university's success, as well as informing the campus space planners in planning for future spaces.

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