

RESEARCH BRIEF

Library Space Design Framework: A Conceptual Analysis

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Academic library spaces are a crucial element in library management that should be taken zealously because it serves as the frontispiece of the entire educational institution. It is more than sketching a floor plan; it transcends beyond the physical layout of the library. It must be able to provide new opportunities for collaboration, focus highly on diversity and personal adaptability, and customization (Neal, 2010). Gone are the days where libraries are considered as a “single-purpose building,” completely stacked up with shelves of voluminous collections (Choy & Go, 2016). Contemporary libraries must be “multifunctional, flexible, user-centered, and supportive of an array of scholarly activities” (O’Kelly et al., 2017, p. 843). Cunningham and Tabur (2012) asserted that libraries have always been more than a “warehouse for recorded knowledge” because they can provide a venue for introspection, assimilation, and construction of novel ideas. Koen and Lesneski (2019) quoted Holmgren and Spencer’s (2014) conclusion that by 2024, a multitude of libraries will be transformed into academic commons whose paramount purpose is to hold academic support services while sustaining a space for the library’s physical collections. This means that academic libraries are striving to achieve more in the upcoming years.

The trend in library space design for the past decades up to the present exhibited a global transformational shift activated by academic librarians in collaboration

with various building professionals, that is, architects, engineers, and interior designers. An explicit example is the rising trend of the creation of a one-stop facility by integrating non-traditional units in the library such as cafés, galleries, and museums (Cunningham & Tabur, 2012). These trends provide prospects for intentional learning, and the design may possibly be propelled by various learner-centered concerns (Bennett, 2009). The change is triggered primarily by the present pedagogy with emphasis on collaborative work (Cunningham & Tabur, 2012), today’s students’ learning preference styles (Oliveira, 2018), fluctuating user preferences and behaviors, diversity of personal and professional needs of the academic community, and the changing roles of libraries due to technological advancements. The academic community members are the central reason why libraries exist. Without them, the library will cease to exist. After all, the prime goal of effective library space and design is to respond to the needs of its service people (Lin et al., 2010; Whole Building Design Guide, 2017). Woodward (2010) also pointed out that libraries must reflect what their clientele wants them to be.

The varying needs of the library clientele posed a great challenge in designing library spaces because the library must be able to respond to those needs to maintain equilibrium in the academic ecosystem. Adjusting to the changing conditions and the capability

to offer various services right away to users is indisputably needed to stay in demand (Zverevich, 2012). Designing a library space is a crucial process that needs deliberate planning before construction and implementation could be done to prevent the possible misuse of available resources, such as the library budget. Library space and design arrangement, whether it is a renovation or new construction, is not an easy thing (Zverevich, 2012). It is also one of the costly managerial activities that library managers may deal with (Nitecki, 2011). In planning for library space, there are many factors to be considered—time investment, financial resources, political capital (Nitecki, 2011), workforce, existential standards and guidelines, local and international directives, policies, among others.

This research was inspired by the need to provide librarians a reference framework to guide their strategic decision making with regards to library spaces. If a library building is just starting from scratch, or if a building has been established before and needs refurbishment and adaptation, library managers may find themselves unequipped on where to commence and what road to take into (Woodward, 2010). Inspired by this dilemma, we formulated this paper. The research agenda is to develop a synthetic framework based on the existing scholarly literature on library space and design frameworks. Specifically, we intend to find solutions to the following research questions: (a) What are the common key areas to be addressed in designing a library space? and (b) From the collated literature, what library space design framework can we develop?

The output of the study can guide librarians, researchers, and Library and Information Science (LIS) students and faculty who intend to gain a better

understanding of the concepts and elements of library spaces and design. Building and design professionals who have no concrete idea about the libraries can also use the framework as their starting point. Further, the proposed framework can be adopted by academic libraries and other types of libraries in designing and redefining their physical spaces to provide the user experience.

We discovered during the initial research phase that there have been no similar studies carried out previously in the local and international arena using the exact research questions and methodology we set forth. Because exploration examining library space design frameworks is a limited research topic in the LIS field, particularly in the Philippine setting, this paper fills the gap in the literature.

Methods

We employed a systematic literature review approach in three phases, based on the research steps of Attia (2020): planning, execution, and report (Figure 1), to critically examine the space design frameworks from various scholarly literature and to identify the essential components of planning and designing library spaces for targeted users. The systematic literature review is a comprehensive and duplicable process of searching, appraising, and synthesizing research evidence of the available works completed by scholars (Dobrkovic et al., 2018; Okoli & Schabram, 2010). Unlike the classical literature review, a systematic literature review focuses on the depth of selected publications over the breadth of available literature on a particular discipline (Attia, 2020).

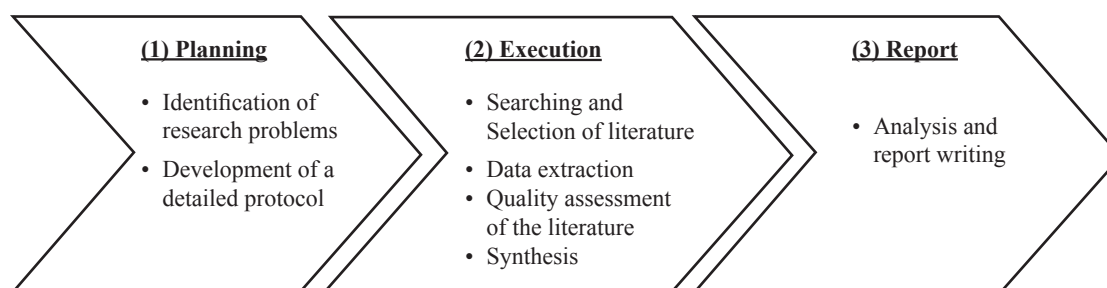


Figure 1. Systematic Literature Review Phases (Attia, 2020)

To ensure consistency in the review execution, we constructed a detailed protocol (Table 1) that primarily served as a guide in the extraction of relevant publications about the topic of library space design framework. The systematic literature review was based on scholarly articles and documents available in Google Scholar, which met the inclusion criteria we set forth. Google Scholar is a search engine and not a database (Robinson-García & Torres-Salinas, 2019) that explores through the pool of scholarly literature across various disciplines and sources such as theses and dissertations, books, online repositories, and other websites (Google Scholar, n.d). Compared to Google, Google Scholar imparts more scholarly content to the end-user and indexes eminent academic research sources (Ganchev, 2013). It is currently the most powerful academic search engine and a “great tool” to start the research process (Robinson-García & Torres-Salinas, 2019; Ganchev, 2013). We chose Google Scholar because of its extensive geographical coverage and the high possibility of gathering scholarly literature in its full-text versions.

The search terms used were “library building,” “library space design,” “framework,” and “academic libraries.” An initial search garnered 48 hits, which were further reduced into 33 hits upon applying search limiters, such as date range. Documents must indicate or propose a baseline model or framework on library space and design. Exact duplicates, non-English articles, book chapters, citations, and patents were

excluded from the master list, resulting only in a total of 11 scholarly documents. We rigorously extracted, scrutinized, and assessed these documents. A final total of 10 scholarly documents published between the year 2009 to 2020 were included. To further assess the quality of the downloaded documents, titles were checked against Scopus. The collection of datasets was conducted in June 2020.

We employed the axiomatic theory fusion (ATF) as the main tool to critically examine the space design frameworks from the extracted documents. ATF is a methodological framework introduced by Horvath (2019) specifically for engineering design theories, which the social science disciplines may get something to learn from. There are currently no known researches that made use of this framework in the field of library and information science.

To test its applicability in the LIS field, we decided to utilize it. Further, ATF is an “effective, content-independent methodology for fusing component theories, no matter if they are descriptive, explanatory, predictive, or controlling in nature” (Horvath, 2019, p. 3591). The goal of ATF is to recreate a new synthetic theory out of the existing source theories by observing and following the decomposed seven sub-processes:

- selection and semantic investigation of the composite theories according to the purpose of theory fusion;

Table 1

Systematic Literature Review Protocol

Parameters	Particulars
Search strings	“library building” AND “library space design” AND “framework” AND “academic libraries”
Source of the literature	Google Scholar
Publication type	Published full-text journal articles, conference proceedings, dissertations
Time window	2009 to 2020
Language	English
Inclusion criteria	Documents indicating or proposing a baseline model or framework on library space and design.
Exclusion criteria	Papers published in other languages Documents without an explicit mention of a library space framework Patents and citations Book chapters

- discretization of the component theories, and deriving and visualization of epistemic elements;
- combination of the sets of epistemic elements and exploring inter-theoretical relationships;
- reducing the alike subject entities and restructuring the relationships graph;
- investigation of the connectedness with regards to subject entities and partitioning based on a matrix representation;
- formulation of propositions and textual transcription of the fused theory; and
- operationalization and validation of the fused theory in application contexts (Horvath 2019, p. 3594).

There is an eighth process, which is to validate the theory. However, due to the nature of this study and being a pioneer exploratory research, this is deemed not applicable at this time.

To start with, we cross-examined the extracted documents by observing the aforementioned sub-processes using a literature review matrix (Table 2) to analyze each element and component of the collated framework. The following important facets were taken note of in the matrix.

These facets are critical components for the decomposition of the existing source theories and their recomposition into a synthetic framework, which is the intended output of this study.

Results

Table 3 illustrates the demographics of the 10 literatures downloaded from Google Scholar. The majority were also indexed by Scopus (6 out of 10). Eight out of the 10 extracted literature are published as a journal article, the other two are in the form of a review and a dissertation. Five research papers are published from the United States of America, three from ASEAN countries (Singapore, Taiwan, Malaysia), and one each from Canada and Russia.

Each literature is critically evaluated vis-a-vis the systematic literature review process and ATF sub-processes. All the significant elements and components of the frameworks presented in each literature were carefully identified and deduced. All of the extracted literature generated useful findings regarding how they viewed and constructed their frameworks. Applying the ATF in breaking down their frameworks into their components, and identifying the various subject entities, describing them, and gathering the various assumptions made in their respective frameworks revealed very clear relationships about the different axioms presented. The ATF technique gave the research a new perspective in which all commonalities among the framework components were easily identified and compared with each other. In these discussions, findings were aggregated into three main commonalities: (a) demographics, (b) linkages, and (c) space design. All these three commonalities were interpreted in terms of library contexts and paradigms and were limited to the frameworks studied.

Table 2
Literature Review Matrix

Facet	Description
Source theories	Refers to the specific literature extracted by the researchers
Framework	Major components of the source theories
Subject entities	Specific components of the framework(s)
Subject description(s)	Definition of the subject entities based on the literature
Assumption(s) about the subject(s)	Inference(s) on the subject entities
Assumption(s) between subject entities	Inference(s) on the relationship(s) between subject entities

Table 3*Literature Demographics*

No.	Reference	Document Type	Source Type	Geographic Location	Framework	Methodology	Scopus-indexed
1	Choy & Goh (2016)	Article	Journal	Singapore	Framework for planning library spaces	not specified	Yes
2	Zverevich (2012)	Article	Journal	Russia	Real and virtual segments of modern library space	not specified	Yes
3	Khoo et al. (2016).	Review	Journal	Philadelphia, PA, USA	Two contrasting models of place	Mixed-method approach	Yes
4	Lin et al. (2010).	Article	Journal	Taiwan	Conceptual framework of space design principles and conditions for learning in academic libraries	Literature Review	Yes
5	O'Kelly et al. (2017)	Article	Journal	MD, USA	Four key attributes of engaging library design	Diagnostic research design using ethnographic qualitative research techniques	No
6	Nitecki (2011)	Article	Journal	USA	Framework to consider different factors affecting library space assessment, and insights for undertaking a meaningful inquiry about the relationship of space to an academic library's purpose and ambitions	Exploratory research	Yes
7	Latfi & Izhar (2017)	Article	Journal	Malaysia	Framework based on user's satisfaction	Quantitative method using questionnaires	No
8	Barton (2018)	Dissertation	Institutional Repository	California, USA	Learning commons framework	Mixed-method approach	No
9	Cunningham & Tabur (2012)	Article	Journal	Canada	Hierarchy of learning space attributes	not specified	No
10	Bennett (2009)	Article	Journal	IL, USA	Three paradigms in the design of library space	not specified	Yes

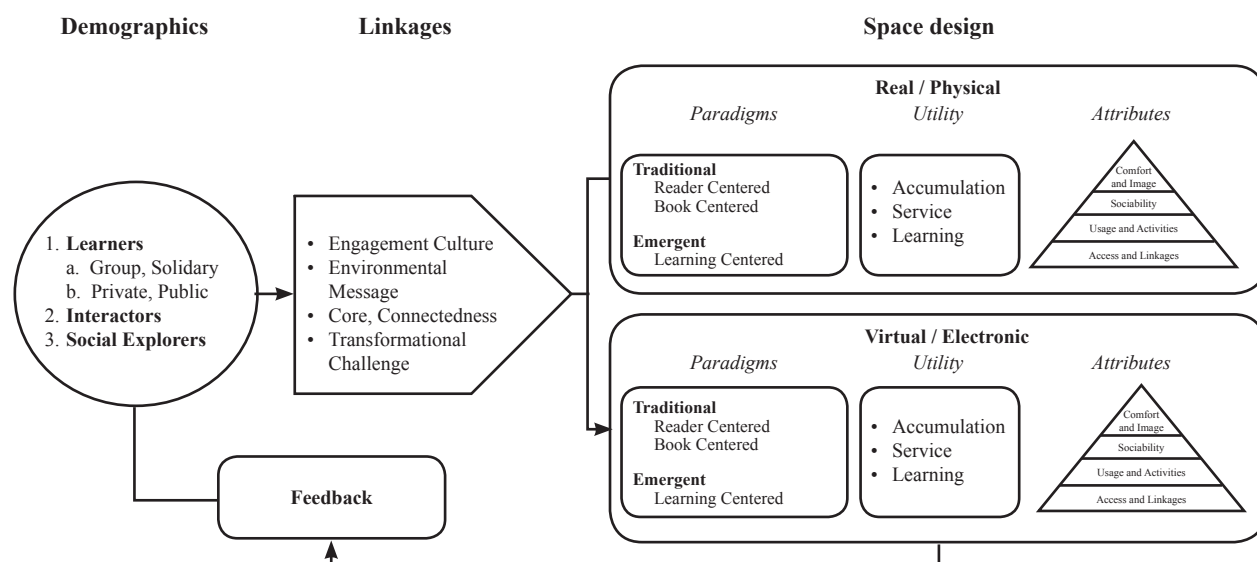


Figure 2. The Library Space Design Framework

Commonalities

Commonality 1: Demographics

This commonality came mainly from the article of Choy and Goh (2016), and the same article was also cited in the study of Latfi and Izhar (2017). Additional inputs were also derived from the framework of O’Kelly et al. (2017). Choy and Goh (2016) mainly discussed that there are four spaces: collaboration space, sanctuary space, interactive space, and community space. Although these spaces were presented as a form of concept prelude to the implication of actual physical space (and will also be used later in the framework, in conjunction with the others), we delved deeper that the article also manifested that there are specific users for each of the spaces mentioned. These are the (a) Learners, (b) Interactors, and (c) Social explorers.

Upon further inspection, it was determined that both Group and Solitary learners represented a dichotomy in learning styles and are both categorized as “Learners” in this study. According to the zones of behavior from the study of O’Kelly et al. (2017), there exists a behavior in which people who are predominantly Group learners prefer to study in private with their own group, and there are people who are predominantly Solitary learners, who prefer to study in public among the presence of other people. This behavior complements the “Public-Group, Private-Solitary” meta-schema of Choy and Goh (2016).

The Interactors and Social Explorers sub-demographics were deemed to be different from the Learners. Interactors were derived from the interactive space mentioned by Choy and Goh (2016), and these are the main participants—users, library staff, or other personnel—who interact with the library’s resources or other participants. Examples of these interactions include the utilization of library computers, consultation with librarians, connecting to the internet, and such. The Interactors have very different objectives from the Learners group in which they do not necessarily use the library for studying in the traditional sense. Social explorers, on the other hand, are participants who are concerned more about the social aspect of the library. These aspects are about activities that join people together for a cause or for advocacy, reinforcing the roles of libraries in the communities. The Social explorers also have very different objectives, enough to be distinguished separately from the Learners and Interactors. The resulting framework gives an idea about the different kinds of demographics available according to the sourced studies, and it indicates that knowing the demographics is a prerequisite before starting any library design planning and activity.

Commonality 2: Linkages

The second commonality is about linkages. These are attributes derived mainly from the study of O’Kelly et al. (2017, pp. 853-858) in which they are called the

“four key attributes of engaging library design.” In this framework, they serve as the in-between relationship between the demographics and the target space design. These are the attributes in which the input of the demographics is taken into account, and the outcome for the space design is determined. The first attribute is the engagement culture. O’Kelly et al. (2017) discussed that there are ways in how users make a connection to the library in terms of spaces and services. It was found out that users should have a choice and control over how and where to do their chosen activities. The goal of this attribute is to find out a user-centric approach that would enable engagement for different activities. The second trait is environmental messages. This attribute is about a macro-level design of the library spaces that would serve as a brand or a symbolic identity. Discussions and studies about whether they want the library to be seen as a place fall in this attribute. The third attribute is core connectedness. This concerns how space enables interaction and building belongingness in the academic community as a whole. Examples of factors that needed to be found out are indicators of connectedness, collaboration, and opportunities for advancement in their learnings. The fourth and last attribute is about transformational challenges. This attribute is all about the abstract notions of purpose about the spaces and the reasons why a design needed to be done in the first place. Questions about the possible outcome of the design activities in the learning of the users and the succeeding transformation of the various cultures of the library, as well as the perception of the demographics, are categorized here.

Commonality 3: Space Design

The third commonality is the space design itself. Almost all the source frameworks have provided elements that were derived and combined with similar concepts from other studies and were presented here. According to Zverevich (2012), library space is divided into two major segments, the real or the physical space, and the electronic or the virtual library space. The real space consists of physical objects like shelves, books, furniture, servers, and other physical manifestations, while the electronic space consists of virtual spaces like computer software, telecommunications channels, websites and blogs, integrated library systems, and the like. This dichotomy is also supported by the framework of Lin et al. (2010), with the impact of technology playing a major part in the role of libraries.

Under the commonality of space design, there are further subcategories: the paradigms, the utility, and the attributes. These subcategories are found to also exist in both the real and electronic spaces; hence the differentiation must be stated. The space design paradigm consists of the traditional and emergent models according to the two contrasting models of place framework of Khoo et al. (2016). Traditional spaces were defined to be comfortable and relaxing spaces with a focus on the quietness policies and individual workspaces. In contrast, the emergent spaces were described to be energetic and engaging spaces focusing on group work areas wherein the activity is encouraged. In the works of Lin et al. (2010), this was described as the social versus communal models, wherein the social model of the library was envisioned to be the place where students and faculty could collaborate in the creation of new knowledge, whereas the communal model pictures the library as a self-learning area. Emergent segments are also similar to the framework “hybrid libraries” where technology and information resources were integrated and the “influence of pedagogy” wherein users are encouraged to have a sense that they own the library space and provide avenues that they can use for changing needs.

Combining with another framework could also explain the traditional and emergent frameworks. According to Bennet (2009), there are three paradigms wherein the first two brought the reader and the collection together. The reader-centered paradigm puts the focus on the readers, the physical space being dominated by lights, reading tables, and the book-centered paradigm, wherein the books and resources are made the focus of the spaces. Translating these two to the electronic spaces, it can be said that a reader-focused paradigm consists of electronic resources that would assist a user in his work akin to grammar software and citation managers, whereas a book-centered paradigm puts the focus on electronic databases and indexes, ebooks, and subscription journals. These two paradigms were categorized to be under the traditional segment. A third paradigm is called the learning-centered paradigm, wherein the focus is put into a group studying spaces and to make it a regular feature of the library. The physical spaces include discussion rooms, long tables, collaboration spaces, and areas of activities. For electronic spaces, these are avenues that provide multi-person communications like online chat rooms, webinar

tools, and collaboration programs. This paradigm is categorized under the emergent segment due to the research's interpretation.

The next subcategory under space design is utility. According to Nitecki (2011), three factors should be taken into consideration when designing library spaces: these are spaces for accumulation, spaces for service, and spaces for learning. These three factors are also juxtaposed in both the physical and virtual spaces. Spaces for accumulation refers to the storage and display areas for books and can also refer to the storage spaces the various electronic spaces take up in the server. Spaces for service are spaces wherein interaction between the librarian, staff, and the users happen. Reference desks, processing offices, helpdesks belong in such physical space, together with their counterpart in the virtual space like ask-a-librarian, chatbots, and feedback systems. The last factor is spaces for learning which refers to space almost exclusively used by the librarians and staff to facilitate knowledge and learning. Examples of this include conference rooms, orientation areas, and library classrooms. In the virtual space, this includes platforms for online orientation, library courses, and webinars.

The last subcategory is the attributes. Coming from the study of Cunningham and Tabur (2012) is the hierarchy of learning space attributes. According to the framework, this schema can be used by library professionals and designers in considering the ideal library and learning spaces. Their framework was superimposed on Maslow's hierarchy of needs, and similar levels and prerequisites were designed wherein the most basic necessities were placed on the bottom, ascending to higher planes of ideals once the current needs were satiated. Like previous frameworks, the physical and virtual spaces dichotomy still applies here. At the bottom of the hierarchy is the basic library principle: access and linkages. These refer to location, zones, collection, and information network that serves as a starting point wherein the students start to learn and be motivated about the library learning space. Spaces for particular activities should be properly identified and segregated. The library's purpose is to provide the users with the knowledge to serve as the linkage in which the users should be given access to the resources, as well as the library linking itself to other libraries through networking such as interlibrary loans and consortiums to heighten the feeling of engagement. Once the basic need for access and linkages has been

provided, the library can then proceed in designing its uses and activities. Starting with this level, there is an increasing engagement on the part of the users. Different behaviors emanating from different demographics should be properly addressed by the wise utilization of spaces. These users might require different seating layouts, different amenities, supplies, and furniture to meet their changing needs, implying that there should be flexibility and modularity, especially with regards to physical spaces.

The next level is about sociability. Once the basic utility of the library space in relation to the users has been set, it is time to take into account the interaction of its users with each other, with the library space serving as a third place. The concept of social models and communal models once again is used as there are specific users who prefer a specific space in accordance with their learning styles. This level seeks to address that there should be a place in a traditional setting, wherein the library space as a sanctuary or a quiet study space is observed, and in contrast, another place in a collaborative environment to enable learning. The highest level is about comfort and image. Proper utilization of this ideal is reserved for those who can satiate the preceding levels. As an abstract concept, this level is the amalgamation of everything else, resulting in a transcendent space that is in accordance with the vision and purpose of the library. How the library is designed is a major factor to bring about this perception. Architecture, branding, atmosphere, and design trends should be harmonized in such a way that the users should be motivated and provide inspiration.

Once the space design has been completed, there should be a feedback mechanism or review to make sure that the library is keeping up to date with their changing user demographics, which will, in turn, affect the relationship linkages and will ultimately have an effect on the space design, repeating the cycle of continuous review and improvement.

Discussion

Library construction and space designing is a crucial project any librarian could undertake, at least once in a while, to become relevant in the next 50 to 100 years. In order to do so, there is a need to investigate the underlying concepts and ideas affecting library space and design. This study is

conducted on the prime purpose of helping library managers in administering such a project and to guide other librarians, LIS students and professionals, and researchers to decipher library spaces better. Coming back to the initial research questions, we presumed that the common key areas to be addressed in designing a library space are the three commonalities uncovered in the study: demographics, linkages, and space design. These commonalities are generic ingredients that library administrators and planners must strive for and should not be taken as a prescriptive solution. Specifics of each commonality may vary, depending on the vision and mission of the library, as well as the internal and external organizational culture and climates (McDonald, 2007).

Reviewing all the sourced frameworks revealed that there are multiple approaches and facets included and that there is really no prescription on how it can be said that there is only one correct way of thinking. This research, however, proved that there are multiple commonalities in each study, and it can be attempted to break them down into axioms: revealing the common themes across studies and enabling the framework components to be mapped towards a new framework with their corresponding entities and relationship.

The resulting framework also highlighted the trends and areas on which the original authors attempted to focus their approaches on, and these became the three commonalities. The frameworks that were used in the demographic commonalities concentrated more on explicitly identifying the key users of the libraries as a way of identifying stakeholders as well as suiting the planned changes in accordance to their intended users. The linkages commonality gave light to the relationship of the users and their approach towards the library space design. This framework is the most organic and serves as the foundation that would justify and direct all subsequent actions in creating spaces, as these are essentially studied inputs that consider all the stakeholders. The space design commonality is where the majority of the studied framework focused on. It can be interesting to note that dichotomies between the real and the virtual, the traditional, the emergent, the reader/collection centric, and the learning-centric are ever-present and all apparent in their paradigms in such a way that they are easily integrated with each other. The utility subcategory revealed a gap that in thinking about the actual physical and virtual spaces, almost all frameworks were focused on the learning spaces,

where in fact, there are two more subspaces that should be given equal consideration—the accumulation and the service space. The last hierarchy serves as a list of prerequisites in prioritizing the elements to be designed. This framework is intended to serve as a modular guide for other professionals with regard to designing library spaces. Each commonality, on its own, provides opportunities for library aspect segregation and better facilitation of resources while still keeping its relationships to other spaces apparent.

Declaration of ownership:

This report is our original work.

Conflict of interest:

None.

Ethical clearance:

This study was approved by the institution.

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