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Creating Library Learning Spaces that Support Twenty-First Century Pedagogy and Student Learning

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ABSTRACT

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University libraries struggle to keep up with rapidly changing technology and the associated change in teaching strategy. Most administrators and librarians are often not trained to assess space needs and struggle to reassign library spaces for non-traditional library use. As such, they often embark on expensive and time-consuming feasibility studies, using (typically) hard-earned monies to complete the research or to pilot a new space. What academic research library administrators and staff lack is an analysis tool for discovering and planning needed renovations and improvements in aging library facilities. The purpose of this research project was to determine how students use library spaces for learning in this new high-tech, hands-on education experience (i.e. synthesis of previous research); develop a tool that can be used by library staff to self-analyze existing academic library spaces, identifying areas that could be improved for student benefit (e.g. provide a checklist of potential learning spaces that institutions should carefully consider adding to their facilities); and provide some examples/case studies of potential facility improvements. The end result is a hierarchical self-analysis tool that merges space options, Abraham Maslow's Hierarchy of Needs, and an example of library-user personas. It also provides some general cost guidelines, helpful construction tips, and a synthesis of exploratory questions related to strategy and space. The tool uses evidence-based design to facilitate important conversations, provide an organized checklist of various considerations, and be a quick reference for library administrators and facility managers as they navigate the world of twenty-first century pedagogy and student learning.

Keywords: library learning spaces, library renovations, Maslow's Hierarchy of Needs, the Hierarchy of Learning Space Attributes, library as place, twenty-first century library, library user personas, personas, evidence-based design, user experience design

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1 INTRODUCTION

1.1 Overview of Research

University libraries struggle to keep up with rapidly changing technology and the associated adjustment in teaching strategy. Technology advancements have also impacted facilities due to the significantly higher student demand for access to wireless internet, cell phone boosters for better reception on personal devices, and on-demand access to almost limitless electrical outlets. These are changes that buildings, even those built as recently as twenty years ago, were not designed to accommodate. In order to maintain their place as an essential part of the academic ecology, libraries must be redesigned to meet the current learning needs of college students. Most administrators and librarians are often not trained to assess space needs and struggle to reassign library spaces for non-traditional library use. As such, they often embark on expensive and time-consuming feasibility studies, using (typically) hard-earned monies to complete the research or to pilot a new space. What academic library administrators and staff lack is a checklist for analyzing and planning needed renovations and improvements in aging library facilities.

When confronted with the need to change the physical space, most library administrators often find themselves unsure of where to begin or what to complete first to make the best, most impactful changes for the student users. This can result in expensive, ineffective changes, or the research process can delay change for many years, leaving the library even farther behind in

providing the needed spaces for students. This study summarizes information from many different library remodels over the past decade, compiling the information into one location for easy reference. It also relies upon the knowledge of library experts to shape an analysis tool for library administrators to determine what changes are needed in their spaces and to help rank those changes in order of importance and immediacy. This will, hopefully, allow library administrators to more easily begin the difficult process of changing library learning spaces to accommodate the needs of twenty-first century pedagogy and learning strategies.

1.2 Research Purpose

The purpose of this research project was to determine how students use library spaces to learn in this new high-tech, hands-on education experience (i.e. synthesis of previous research); develop a tool that can be used by library staff to self-analyze existing academic library spaces, identifying areas that could be improved for student benefit (e.g. provide a checklist of potential learning spaces that institutions should carefully consider adding to their facilities); and provide some examples/case studies of potential facility improvements. With the abundance of resources in various formats (books, webpages, journals, libguides, specialists, webinars, etc.) related to twenty-first century academic library space, it can be overwhelming to weed through and prioritize all the information in a timely manner. The author's hope was to create something research-based, useful, and inexpensive to assist academic library administrators and staff begin or continue progressing toward a library of essential spaces for current library users.

1.3 Organization of Thesis

This thesis is comprised of a literature review, a description of the methodology used to obtain expert input, and an explanation of the new self-analysis tool: "Start Here: A Hierarchical

Guide to 21st Century Library Learning Space Renovations". The literature review summarizes previous research about prevailing space improvements for academic libraries, including examples of common pedagogy styles currently used in higher education and information about some existing learning-space related tools. The methodology section provides details about research methods used as well as the structure of an expert panel consulted for this research. Additional chapters discuss the self-analysis tool (which can be found in Appendix A), providing detailed descriptions of both the example library personas and definitions of the levels identified in the space hierarchy. There are also several examples of space improvements in existing academic library facilities included for each hierarchical level. Finally, some additional areas for further research are delineated.

1.4 Limitations of Research

The largest potential limitation of this research is the small research pool and the applicability of the information beyond that pool. Sound research methodologies have been followed to avoid this, but the potential still exists. Additionally, the universality of this tool to any library (public, elementary, secondary, etc.) or education facility has not been proven, nor is it intended. It is possible a space hierarchy could be created for (or this space hierarchy could be adapted to) other types of educational facilities. However, that effort falls outside the scope of this particular research venture.

1.5 Definitions of Key Terms

There are some key terms appearing throughout this text that should be defined early. When the author indicates a twenty-first century academic library, this includes any library associated with an institution of higher education. These can be public universities or private

universities, main libraries or branch libraries. Some universities have a central/main library containing all of the research collection, regardless of subject. Some institutions have many smaller libraries with different emphases (i.e. the Math Library, the Architecture Library, the Law Library). This tool is designed to be generic enough for use in any academic library, whether a main library or a subject-focused library.

A persona is a term usually found in the marketing and design world. It refers to a description of a single person who represents a group of individuals with common use patterns and needs (Mckay, 2010; Schmidt, 2014). The example library personas used in this study were created by Dr. Holt Zaugg, the Assessment Librarian at Brigham Young University, with the assistance of student researchers from an upper level Communications class (Zaugg, 2016).

The Hierarchy of Needs was created by Dr. Abraham Maslow, a 20th century psychologist, who postulated that humans meet their needs based on a five-level hierarchy described in more detail later in this writing. However, the basic idea is that humans cannot successfully move to the next level of the hierarchy until their lower level needs are met. This principle has been applied to space needs in this project.

The term "user" is often mentioned in both singular and plural form. In this context, a "user" is an individual who seeks to engage in some manner with a library space, resource, or service. It is often used in conjunction with library (as in "library user"), but for the purpose of writing flow, it is sometimes stated on its own.

2 LITERATURE REVIEW

2.1 Why Change?

Library configuration has been a subject of discussion since shortly after the Civil War (Breisch, 1982). For academic libraries, pedagogy drives the changes in library design (Chad and Anderson, 2017), and changes in pedagogy are happening in response to the growth of the networked world (Proffit et al., 2015). Technology and media (i.e. books, computer, video, journals) are changing, but library users' needs, habits and expectations are also evolving. "Going to the library adds value to [students'] lives and offers … tools and experiences that will give [students] the competitive edge they will need to succeed after their formal education is complete" (Freeman, 2005). Therefore, it is essential librarians understand how people interact with library resources, with other people in the library, and with the library space (Designing Libraries Workshops, 2017). Academic libraries have historically "been designed first and foremost as places to collect, access, and preserve print collection" (Freeman, 2005), but that view is shifting. Increasingly, the best use of the twenty-first century library building, typically located in the heart of campus, is primarily as a people's space. This may necessitate the compression of print materials to make room for the space needs of the library users (Allen, 2016), and also requires librarians to understand how students learn "with the goal of facilitating their learning in the space they choose" (Montgomery, 2014).

Beyond the changes to pedagogy, students are learning differently. Most twenty-first century students consider themselves adept at using social media and technology, often finding information they deem "good enough" for their scholarly needs (Association of College and Research Libraries, 2013). Users adopt behaviors that they believe will lead to success (Proffitt et al., 2015; Connaway, 2008), and this tendency for students to accept the "good enough" option can lead students to "satisfice" [combination of 'satisfy' and 'suffice'] their need for information based on what they are able to find and thus stop looking for more information (Prabha et al., 2007). In a world producing an estimated five exabytes of data per day (Gaiman, 2013), it is essential that librarians strategically place core information in easy-to-find locations (Proffitt et al., 2015). This should include both physical and virtual space, so that users can feel as comfortable navigating the library as they feel navigating social media.

The demand for more people-space and the tendency of students to stop looking after finding a "good enough" option push toward the need for space changes in library facilities. In opposition to some who believe that libraries are irrelevant, "libraries are about freedom. Freedom to read, freedom of ideas, freedom of communication. They are about education (which is not a process that finishes the day we leave school or university), about entertainment, about making safe spaces, and about access to information" (Gaiman, 2013). In that mindset, the academic library and technology do not need to be adversaries. Where technology and remote access can provide information in isolation, the physical library can bring people together (Bailin, 2011). "Technology alone does not meet all of a person's needs, and people continue to crave a physical location to access information and each other" (Chan and Spodick, 2014). Because providing quality study space increases library use, improving and expanding

communal study spaces could be an excellent investment for the future of academic libraries (Gayton, 2008).

Academic libraries need to start viewing their space as a performance enhancing tool (Miller et al., 2014) for students and need to strive to provide users with unexpected moments of "discovery and delight" (Van Orsdel, 2016) while in the facilities. Much like current trends in public libraries, academic libraries should no longer be a static experience (e.g. memorizing from books, studying in isolation) but a dynamic one (e.g. hands-on exhibit spaces, makerspaces, collaborative spaces designed for group work, whiteboards provided to write out ideas and teach others), designed to assist library users in achieving their desired outcomes (Paladino, 2014; Pasicznyuk, 2014). As Jim Neal, a previous president of the American Library Association, has said, "we need to bring the classroom and the academy into the library, thinking more about playground and less about sanctuary" (Neal, 2011). Academic libraries should meet students' informal learning space needs by providing spaces that are not available in other campus locations (Chan and Spodick, 2014; Cunningham and Walton, 2016).

2.2 University Pedagogy

Pedagogy drives change in academic libraries, and academic libraries must respond to the pedagogical needs of their sponsoring institution by transforming the type of spaces offered to students. As Jeffrey Gayton (2008) said, "learning is increasingly seen as a collaborative process among faculty and students", and libraries must, therefore, provide space to allow these types of collaborations to occur. Additionally, the diversity of the current student body suggests a need for different types of teaching and learning initiatives outside of the standard lecturer/learner format (Behnke, 2012; DeWitt and Gloerfeld, 2018; Palmer, 1998; Rhem, 2012).

There are numerous styles of pedagogy, some of which frequently include:

- Blended learning—combines online activities and face-to-face interactions to teach curriculum and reinforce lessons learned in both mediums. Blended learning courses can be front-loaded (students are given access to most or all of the content prior to the face-to-face class and are expected to attend class familiar with the topic of instruction) or back-loaded (students are introduced to information regarding a topic and how the framework fits together and are then expected to incorporate the details and elaborate on the topics online) (Behnke, 2012; Glazier, 2012)
- Contract learning—a more specific type of blended learning, contract learning allows a student to select from an existing menu of activities what will be completed in order to fulfill established course requirements (Glazier, 2012)
- Cooperative learning—creates a highly structured learning environment reliant upon small, diverse groups to problem-solve while taking individual accountability (Millis, 2010; Cottell, 2010)
- Inquiry-based learning—encourages student research on subjects of interest, including the identification of research questions, the development of research design, the collecting and interpreting of data, and then the reporting of results (Kergel and Heidkamp, 2018)
- Phenomenological approach—allows the experiences of class members to drive discussion and course content, connecting personally relevant experiences to academic subjects (Greenberg et al., 2019)
- Problem-based learning—students are presented with a problem to solve before being given information to solve it and are then asked to resolve the problem using

problem-solving methods, identifying missing information along the way (Cottell, 2010; Burke, 2015)

- Service learning/community-based learning—ties curriculum to community service by using community service experiences to teach, to inspire reflection, to create an enhanced sense of moral and civic responsibility, and to provoke innovative solutions to social problems (Enos, 2015; Winfield, 2005)
- Social learning—learning becomes a social experience where students contribute to the discussion rather than only absorbing content (Montgomery, 2014)
- Team-based learning—a more specific type of cooperative learning, team-based learning places students into semester-long permanent teams who then work together to solve complex problems (Glazier, 2012)

It is likely that many and more of these pedagogy styles can be found at any institution, regardless of size, although there is likely a predominant method or two. Library administrators must work closely with campus administration to understand the campus vision for pedagogy, and then plan for complimenting spaces and collections.

2.3 Library as Place

It is important to remember that some view a library as merely a space—a space to store books or to provide study tables. However, as people create memories and make social connections in a space, that space becomes a place (Mathews and Soistmann, 2016). Libraries often become a place between home and work where people can connect and unwind. "It is a place where people come together on levels and in ways that they might not in the residence hall, classroom, or off-campus locations" (Freeman, 2005). One of the goals of twenty-first century

academic libraries should be to create a "sticky" library by "creating the right environment to retain students throughout the day" (The UK Higher Education Space Toolkit, 2019). "Libraries become truly significant when their value extends beyond the outputs they enable", and librarians must make choices about space that enable the library to become a "significant part of the learning and research journey" (Mathews and Soistmann, 2016).

2.4 Key Design Concepts

Some key design concepts academic libraries should investigate include spaces that are digital, mobile, independent, social, and participatory (Bailin, 2011). "A good library is one that feels domestic rather than institutional" (Mathews and Soistmann, 2016). Students need access to appropriate technology, more natural light, inviting ambiance, more electrical outlets, and both group and individual study spaces (Belliston et al, 2011). Libraries also need to be comfortable, safe, well-lit, and flexible to use (Schlipf, 2011), providing uninhibited movement between a variety of spaces. Overall, library spaces should inspire learning and study for all of their patrons, with space decisions being based on the mission of the library (Bostick and Irwin, 2014; Dallis, 2016; Feinberg and Keller, 2010; Freeman, 2005; Mathews and Soistmann, 2016), on the ecology of the campus, and upon actual behavior of users and not limited by normative, idealized, or outdated assumptions (Proffitt et al., 2015).

2.4.1 Knowing the Mission of the Library

Library administrators must determine, before remodel projects begin, the mission and/or purpose of their academic library (Feinberg and Keller, 2010; Mathews and Soistmann, 2016; the UK Higher Education Learning Space Toolkit, 2019; Dallis, 2016; Freeman, 2005). This clarity of purposes helps keep any project on track (Feinberg and Keller, 2010), and it also allows the

message of the library to be clear to staff, administrators, faculty, and students (Mathews and Soistmann, 2016). "The current abundance of information sources means that access to information is no longer a primary reason for bringing people together, and we need to rethink the types of learning students undertake in these collective situations" (the UK Higher Education Learning Space Toolkit, 2019). As academic libraries transition to this newer, more student-centric and less information-access-centric model of space management, adhering to a mission can also create much needed buy-in from library staff (Dallis, 2016). Forging a vision based on a thorough analysis of student and faculty usage and learning needs will often yield a higher return on investment than investing in maintaining the status quo (Freeman, 2005). As Woodward (2009) says, "we must show 'radical trust' for our customers. This term refers to the willingness of library decision makers to trust their customers to help them redefine and redesign the library."

2.4.2 Space as a Tool

Space design communicates heavily to the students about how a space is to be used. The physical environment can help or hinder learning, and traditional learning spaces suggest a very specific pedagogy—one person is the expert and everyone else must learn by listening to the expert (the UK Higher Education Learning Space Toolkit, 2019). Librarians must carefully consider what behaviors and outcomes are wanted, and then space must be designed specifically to enable those things (Mathews and Soistmann, 2016). "Perhaps the best way to approach the twenty-first century library is to focus on the total student experience and the ways in which the library can enhance it" (Woodward, 2009). Librarians can curate exceptional collections, but they can also learn to curate the emotional states of occupants and users of library space (Mathews and Soistmann, 2016). If a space is meant to be a creative space, users should be

given room to make a mess and allowed to be less neat (Mathews and Soistmann, 2016). Colors should be vibrant, and reasonable levels of noise should be expected. For individual study, libraries can provide small, cozy nooks (Woodward, 2009) and smaller tables that allow for "personal space and invisible boundaries" (Steinhoff et al, 2015) while also allowing communal learning. Acknowledging the social dimension of learning behaviors by creating spaces that allow students to manage socializing and studying concurrently is essential (Bennet, 2007). Librarian workspaces should be located in public areas (Woodward, 2009; Steinhoff et al 2015; Bostick and Irwin, 2014; the UK Higher Education Learning Space Toolkit, 2019), and librarians should strive to eliminate the stereotype that they possess "authority over knowledge":

> The archetypal behavior for asserting authority over knowledge is the faculty member's lecture; the archetypal space designed to reinforce that authority is the classroom, with the teacher standing in front and in command of the chalk board and other teaching technologies, while students are seated attentively facing their instructor. There are many other ways we design spaces to reinforce claims to authority over knowledge. Examples include book-lined faculty offices and librarians ensconced behind monumental reference desks with the ready-reference collection and a computer at their command (Bennett, 2007).

Other ways libraries traditionally perpetuate the student/teacher hierarchy involves transitional spaces:

> [Transitional spaces] are not equipped to facilitate learning or interaction and reinforce the message that students do not learn until they move into formal learning spaces with a lecturer present. The separation of support services and places where staff spend time also creates a distinction that puts the student in a role as recipient of information rather than a member of a learning community with an ethos of research engaged teaching (the UK Higher Education Learning Space Toolkit, 2019).

Twenty-first century libraries must work to create spaces that allow students to both create and consume knowledge. However, in their desire to create new, inviting, stereotype-challenging spaces for students, administrators must also avoid the pitfall of creating a space for no other reason than to create a space. Remodeled spaces should solve actual problems or

shortfalls of the existing library and/or campus and should make learning easier for both students and faculty (Martinez and Stager, 2019). “If you can’t imagine some group of customers for whom this service would make a significant difference, then your efforts can be better spent on something else” (Woodward, 2009).

2.4.3 Natural Lighting

Richard Renfro, a lighting designer, is quoted as having said, “light is the medium through which we interpret space” (Feinberg and Keller, 2010). Installing patron space next to windows or within easy access of natural light allows patrons connection to the outdoors and provides context for where they are in the surrounding environment (Feinberg and Keller, 2010). Study spaces located near daylight tend to be among the most popular areas in an academic library (Steinhoff, Rudalavage, and Wang, 2015). Additionally, the health benefits of natural light are many. “The National Renewable Energy Laboratory’s review of the effects of natural light on building occupants showed that it reduces the effects of seasonal affective disorder, increases visual clarity and color perception, boosts vitamin D absorption and stimulates the pineal gland, which helps to increase mental alertness, improves mood and regulates sleep patterns” (Ford, 2017).

2.4.4 Security

Lighting of any type becomes an essential piece of security within a library. Open sight lines and well-lit stacks are important to library visitors, especially females (Woodward, 2009; Applegate, 2009). “Students will not use a facility they consider unsafe” (Woodward, 2009); therefore, efforts should be made to eliminate dark corners and untraveled areas.

2.4.5 Increased Access to Electricity

Many students tend to spend large amounts of time in the library, and even if there is appropriate access to wireless internet, electrical access for recharging personal devices can be an issue (Applegate, 2009). Twenty-first century students have "substituted personal computers for paper and pen" (Woodward, 2009), and library users want the ability to plug in personal devices in areas of personal comfort (Applegate, 2009; Montgomery, 2014; Bostick and Irwin, 2014). "Regardless of the technology [that] students use in learning spaces, they will need power" (The UK Higher Education Learning Space Toolkit, 2019). With students now typically carrying multiple electronic devices at any given time, finding an available electrical outlet in older buildings can be difficult. Additionally, current residential code in some locations requires that outlets be provided no farther than twelve feet apart, so academic library patrons expect outlets to be just as abundant in their educational surroundings as in their residential ones. Older buildings were simply not wired to meet that expectation or for the proliferation of electronic devices that are currently used for research purposes in this digital age (Tokasz, 2016).

2.4.6 Technology

Technology is often blamed for the death of the book. However, it has neither caused the book's demise nor made library's obsolete. Instead, "the integration of new information technology has actually become the catalyst that transforms the library into a more vital and critical intellectual center of life at colleges and universities today" (Freeman, 2005). Students are now immersed in a digital, connected, social world, therefore, requiring guaranteed 100% wireless connectivity in all learning spaces and accommodating for a high density of users (the UK Higher Education Learning Space Toolkit, 2019). Other technology essentials include library-owned and maintained computers, printers, and emerging technologies which provide

experimentation and skill development for students (Steinhoff et al 2015; Putnam and Gonzalez, 2018). However, it is important to remember that new technology is expensive, so allowing for-profit institutions to make mistakes with and provide valuable feedback about bleeding-edge technologies is essential before installation in an academic library (Woodward, 2009). Administrators also need to remember that technology cannot take precedence over people (Mathews and Soistmann, 2016).

2.4.7 Flexible Space/Furniture

Flexible areas allow students with different preferences to find a space that suits their needs and work habits (Bailin, 2011), but the concept of flexibility is more about how a space is designed and not just about furniture on casters (Dallis, 2016). Flexibility encourages learning by recognizing the social dimensions of study and allows students to control the organization of their study space (Bennett, 2007). Something as simple as whiteboards, both fixed and portable, is an essential addition to academic libraries (van Orsdel, 2016) and can improve the flexibility of a space. Also, making technology more moveable and eliminating large, anchored service points can assist the flexibility of a space (Dallis, 2016). If the academic library chooses not to create these flexible, welcoming spaces, then students will seek them out elsewhere. Students are not necessarily deserting the academic library but are instead making less use of outdated facilities or uncomfortable environments (Bailin, 2011). Therefore, providing spaces that allow for movement of furniture and of bodies will likely attract more students to the academic library. It is important to note the library cannot provide all space for all things, so library space must be carefully examined in connection with other university space offerings. Strategic decisions must be made, allowing the flexibility to better support a range of learning activities beneficial to the university as a whole (The UK Higher Education Learning Space Toolkit, 2019).

2.4.8 Variety of Space Offerings

The way a space is designed, from aesthetics to accessories, instructs users on what activities (e.g. contemplative, collaborative, passive, active, quiet, loud) are appropriate in a library space (van Orsdel, 2016). To accommodate a wide variety of uses, library spaces should be designed with an open platform approach that embraces multiple configurations (Chan and Spodick, 2014). "The more that elements … can be kept separate from the physical envelope and servicing strategy of the overall building, the more opportunity they have to change" (The UK Higher Education Learning Space Toolkit, 2019). It is important to allow pedestrian traffic to flow freely between the variety of spaces provided, whether more traditional or more collaborative. "The arrangement of the library—architectural structures, furnishings, flooring—should help users find their way" (Feinberg and Keller, 2010). The most used spaces in academic libraries tend to be group study rooms/areas (Dallis, 2016; Applegate, 2009), but students often want individual or quiet study spaces to be located near group study rooms (Cunningham and Tabur, 2012) due to their need for background noise when studying (Chan and Spodick, 2014). When making future plans for library spaces, it is important to assess both areas that need more space due to popularity among users and also areas that are underused which could be renovated to meet more pressing space needs (Hanford, 2015). Often in academic libraries, this involves the relocation of book collections, which can be a difficult and politically charged subject with librarians and faculty. However, "print materials are compressible; people are not compressible" (Allen, 2016).

2.4.9 Maintaining Some Traditional Library Spaces

Even with all the changes in technology and pedagogy in the current digital age, the academic library remains the preferred place for the stereotypical library activity: studying

(Applegate, 2009). As such, it remains important to maintain some areas that are thought of as more traditional library spaces. These areas often include spaces of deep quiet with higher-quality furniture where students engage in solitary, contemplative study (Chan and Spodick, 2014). Interestingly, the traditional reading room, with its "great, vaulted, light-filled space, whose walls are lined with books [students] may never pull off the shelf" is often students' favorite area of the academic library (Freeman, 2005). While students seek out collaborative, creative spaces with cutting-edge technology, some students also need spaces devoid of moving images on large screens to promote thoughtful reflection and concentration (Dallis, 2016). Studying between open stacks can be peaceful and is often interpreted as scholarly (Wilders, 2017). Also, communal studying—the idea of studying alone while co-occupying space with others who are also studying—is often an important aspect (Gayton, 2008) which should be preserved in libraries designed for the twenty-first century student.

2.4.10 Spaces of Wonder and Delight

While practical in their purposes, academic libraries must also be "an iconic centerpiece for a campus" (Bostick and Irwin, 2014) and places of "wonder and excitement" (Kent, 2005). Mixed in between the stacks of books and the study carrels, there should also be art objects, sculptures, and whimsical and adventurous moments. This could include exhibits highlighting rare and delightful library-owned content. It could also include celebrations of learning—items like scientific posters, engineering models, the results of research projects, and student-created art installations (Bennett, 2007; Kent, 2005). When designing, it is important to leave some spaces unfinished and discover the unpredictable uses imagined by learners (Mathews and Soistmann, 2016).

2.4.11 Fitting in to the Campus Ecology

Academic library administrators must understand the needs and the mission of their sponsoring institutions in order to best align their spaces to support campus initiatives (Myerburg, 2017; Rodger, 2007; Paladino, 2014; Freeman, 2005) and graduate outcomes (the UK Higher Education Learning Space Toolkit, 2019). "The better we understand the people using our buildings, the better positioned we are to provide them with relevant collections and services" (Mathew and Soistmann, 2016). For the academic library to remain an important part of the campus ecology, the library must know where it fits in the academic community (Woodward, 2009) and must fill a need that no other organization can meet (Schmidt and Etches, 2014). The library must adapt to changing pedagogical strategies (Proffitt et al., 2015), and systematic observations of campus areas outside of the library can allow library administrators to tailor library design to meet those needs (Applegate, 2009), basing space decisions off of curriculum requirements (i.e. heavy reading and writing loads would indicate the need for more individual spaces while collaborative assignments with specialty software needs would require a different space solution) (Mathews and Soistmann, 2016). It can also put librarians in an influential position to contribute to university-wide strategy relating to learning spaces (Matthews and Walton, 2014). "Focusing on the intersections between user needs and campus goals can lead to amazing things" (Proffitt et al., 2015).

2.4.12 The Library Belongs to the Students

Library administrators and staff must remember that libraries belong to library users and not to librarians; patrons are not guests and should not be treated as such (Rodger, 2007; van Orsdel, 2016). To provide the most useful and effective spaces for students, library administrators should seek to understand students' spatial choices and should invite student input

about proposed space changes (Applegate, 2009; Polaine, 2013). Libraries, in both concept and application, are spaces intended to welcome all for as long as they choose to stay (Paladino, 2014), and therefore, should be designed to inspire, to engage, and to assist the students in their successful completion of class requirements. Academic library administrators and staff must begin viewing students as, first and foremost, learners. This places the focus on enhancing academic needs instead of satisfying customers (Mathew and Soistmann, 2016). Often, innovative spaces fail with learners because either 1) learners were not involved in the design process, and/or 2) those who would benefit from the space are not made aware of the change (Woodward, 2009). Library research continues to illustrate the essential piece learner input provides for library space design (Montgomery, 2014; Bennett, 2007; Sadler, 2015), and "success will continue to evade [academic libraries] until [they] accept [learners] as full partners and embrace their ideas as we would those of library professionals" (Woodward, 2009).

2.5 But What About the Books?

As previously mentioned, it is important to analyze all space when discussing space needs, identifying areas that are both less efficiently and less effectively used (Hanford, 2015). Facility-related costs to maintain shelving and real books in libraries is (arguably) significantly more expensive compared to maintaining access to the same virtual content (Myerberg, 2017). In addition, traditional educational institutions are now facing growing competition from lower-cost online education programs and must find ways to entice potential students (Plotnick, 2017). Those enticements often include emphasis on the face-to-face interactions and hands-on learning that can be found on a university campus, activities of which most have associated space requirements. Because of increasing availability of online content (e.g. journal, e-books) and decreasing book circulation statistics, campus administrators can begin to view the library as

prime real estate for forced change (Woodward, 2009). However, with forethought by library administrators, the library of the past—once mostly a warehouse for books—can be repurposed into spaces that facilitate teaching and learning (Myerberg, 2017; Washburn et al., 2013). Library administrators can implement proactive steps (e.g. joining collection consortia, eliminating duplicate volumes, implementing demand-driven acquisition policies) to begin making room for viable and essential student learning spaces, demonstrating the value and the impact of the library on student learning (Matthews and Walton, 2014). If librarians refuse to make collection adjustments, library administrators could propose decreasing the size of library staff spaces to allow more room for patron needs (Lindley, 2016). Either option would indicate a focus on the library user as opposed to a focus on the library collection, an essential change in academic library strategy (Neal, 2011; Montgomery, 2014; Bostik and Bryan, 2014).

Books are still important to academia. "The truth is that each form of media has a place and continues to contribute" (Arnett, 2018). Research supports the positive contribution books provide for the learning experience of students, and some disciplines (like Humanities) will likely always remain book-centric (Wilders, 2017). However, if library buildings are filled with musty, dusty, dated material that has not circulated in ten years or more, students and faculty "will decide [the library] is musty, dusty, and dated" (Woodward, 2009). The dated practice of 'just-in-case' access (keeping rarely used and duplicated materials on site just-in-case someone might need them) is expensive and unsustainable (Genoni, 2008). By working with the academic units, librarians can provide pedagogically supportive collections, can enhance student and faculty research, and can promote literacy and self-reliance for the students (Woodward, 2009; Feinberg and Keller, 2010), all while helping to create spaces that inspire learning, encourage collaboration and creativity, and produce content. More poetically, by repurposing spaces once

occupied by unused books, librarians can fill their buildings "with small invitations that trigger intellectual, creative, or cultural curiosity" and the academic library can become "a serendipitous environment where chance encounters gratify the mind" (Mathews and Soistmann, 2016).

2.6 Existing Analysis Tools

There are a variety of existing space analysis tools and almost infinite possibilities for space usage. With so many different options and needs for twenty-first century students, it can be a struggle for library administrators and staff to make decisions regarding the most important or the best renovation choices to improve library facilities.

2.6.1 The Hierarchy of Learning Space Attributes

Heather Cunningham and Susanne Tabur, both library professionals from the University of Toronto, created the Hierarchy of Learning Space Attributes (Cunningham and Tabur, 2012), a tool that combines Maslow's Hierarchy of Needs (Maslow, 1943) and four principles of space desirability for libraries developed by architect Fred Kent (Kent and Myrick, 2003).

Abraham Harold Maslow (1908-1970) is the 10th most cited psychologist of the 20th Century (Haggbloom et al., 2002). One of his "most enduring contributions to psychology" (Koltko-Rivera, 2006) is known as Maslow's Hierarchy of Needs. In this theory, Maslow postulated that human beings meet their needs based on a five-level hierarchy. The levels as described by Maslow (1943) are:

- Level one (lowest)—Physiological (survival) needs: seeks to obtain basic necessities for life (air, food, drink, shelter, etc.)

- Level two—Safety needs: seeks security through order and law (stability, freedom from fear, protection from elements)
- Level three—Belongingness and love needs: seeks affiliation with a group (belongingness, affection, love)
- Level four—Esteem needs: seeks esteem through recognition or achievement (mastery, independence, dominance, prestige, respect from others)
- Level five (highest)—self-actualization: seeks fulfillment of personal potential (personal growth, self-fulfillment, and peak experiences)

These needs are met in a serial order, so a person cannot move to Level Two (safety needs) if Level One (physiological) needs are not met, and extreme life experiences can cause fluctuation between the levels (McLeod, 2007).

> It is quite true that man lives by bread alone—when there is no bread. But what happens to man's desire when there is plenty of bread and when his belly is chronically filled? At once, other (and "higher") needs emerge and these, rather than physiological hungers, dominate the organism. And when these in turn are satisfied, again new (and still "higher") needs emerge and so on. This what we mean by saying that the basic human needs are organized into a hierarchy of relative prepotency (Maslow, 1943).

Cunningham and Tabur combined Maslow's Hierarchy of needs with Fred Kent's four principles of space desirability for a library:

- Access and linkages (lowest)—central location, different zones for students (quiet study, group work, socializing, etc.), learning resources, content access
- Uses and Activities—comfortable furniture, technology, collaborative space, writing labs, art galleries
- Sociability—group and quiet study spaces, traditional spaces, ability to form connections with other students

- Comfort and Image (highest)—ambience, natural light, scholarly atmosphere

The idea is a library should focus on each tier in sequential order, focusing attention and monies on fulfilling needs in the lowest incomplete tier before moving on to the next. As Cha and Kim (2015) state, "when a more important space attribute is satisfactory, then a less important space attribute may subsequently be considered."

2.6.2 Seven Principles for Good Practice

In 1987, Arthur Chickering and Zelda Gamson proposed "seven principles for good practice in undergraduate education." These seven principles (identified below) are also applicable to space design.

1. Encourages contacts between students and staff
2. Develops reciprocity and cooperation among students
3. Uses active learning techniques
4. Gives prompt feedback
5. Emphasizes time on task
6. Communicates high expectations
7. Respects diverse talents and ways of learning

Some questions library administrators could ask when designing new spaces include:

- Are there barriers between students and library staff? Does the space design encourage students to find librarians and seek out assistance or does it make library staff difficult to find and to approach? (Principle 1)

- Does the space design encourage collaboration? Is there enough space for group work? (Principle 2)
- Are students free to move through the space and to rearrange and to socialize? (Principle 3)
- Does the space design allow students the ability to easily show or tell library staff about student thoughts and opinions? Do library staff seek out student feedback and input? (Principle 4)
- Is there quiet space, designed to accommodate deep dives and long study session? Are the physical needs—food, drink, safety, biological needs, etc.—of a student adequately met to allow for a long stay in the library? (Principle 5)
- Are the students surrounded by the academic triumphs of others? Are high quality works exhibited and made available for student viewing and access? (Principle 6)
- Are multiple types of spaces offered within the library walls? Are there different furniture types, sizes, and aesthetic colors? Does library space allow for tactile learning, visual learning, regurgitation, primary research, etc.? (Principle 7)

2.6.3 The UK Higher Education Learning Space Toolkit

The UK Higher Education Learning Space Toolkit (2019) was created as a collaboration between three United Kingdom entities: the Standing Conference for Heads of Media Services (SCHOMS), the Association of University Directors of Estates (AUDE), and a membership organization representing those responsible for delivering information management systems and technology services in universities and other institutions (UCISA). This toolkit is focused on general learning spaces and not libraries specifically. However, a couple of useful insights from

this toolkit include the following characteristics of a space that should be considered when designing quality learning environments:

- Intended use—what learning and teaching scenarios will happen in the space and who are the primary users?
- Adaptability—can the space be easily and quickly reconfigured to meet the needs of the identified learning and teaching scenarios?
- Inclusivity—is the space readily accessible and useable by all members of the student and staff population?
- Usability—"Spaces that are easy to use will be used." (The UK Higher Education Learning Space Toolkit, 39) Are interfaces simple and intuitive?
- Comfort—is the space temperature correct and is there natural light available?
- Proximity—is the space easy and convenient to access?
- Sustainability—is the space environmentally friendly? Is it easy to maintain, and how often will the technology need refreshed?

2.6.4 Stewart Brand's *How Buildings Learn*

Stewart Brand authored a book, *How Buildings Learn*, discussing the life cycle of a building after it is built (Brand, 1994). Buildings change purposes and owners over time, and buildings can also have a profound impact on how a community develops. However, an important point to remember when either constructing a new building or remodeling an existing one involves the layers of a building (see Figure 1). A site determines what is built on it. The structure determines shape. The skin determines aesthetics. The services provided happen inside the structure, and the space plan should be informed by the services. The "stuff" is all the

items placed inside a space, and it is determined by the space plan. Buildings by their very nature are hierarchical, and the more "stuff" kept unattached from the building structure makes it easier to adjust the space plan to meet new service needs.

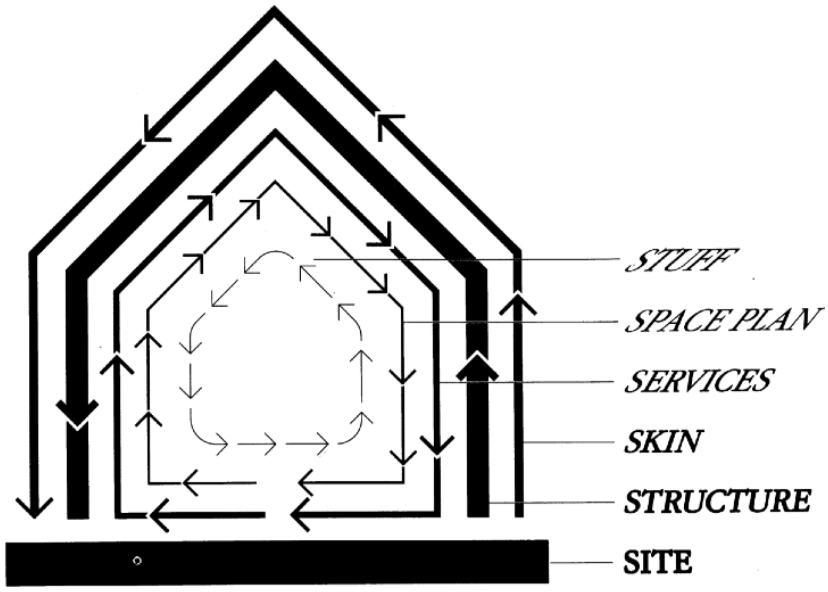

Figure 2-1 Different layers of a building (from Brand, 1994)

2.6.5 Meyer and Stewart's *Evaluating Physical and Virtual Space to Support Teaching and Learning*, 2007

Empirical and ethnographic data was gathered by Meyer and Stewart (2007) about learning spaces at the Georgia Institute of Technology. Those compiled results indicated the following as core attributes for teaching and learning spaces:

- A destination that attracts one's friends with design focusing on productivity, engagement, and academic socializing
- A space for faculty to mix with peers of other disciplines

- Spaces for faculty and students to experience planned and serendipitous encounters
- All services, staffing, and assets enhance learning and productivity
- Aesthetics (lighting, views, temperature, etc.) and security are purposeful
- The university is celebrated by showcasing inspiring speakers, compelling research, and campus-produced art and exhibits
- Technology to both meet the immediate needs of students and to encourage discovery and exploration
- A variety of spaces and furniture to meet varied personal needs of students
- Food and drink allowed or even provided

2.6.6 Other Helpful Questions

Dr. Scott Bennett, a Yale University Library Emeritus and a consultant for library and information science fields, developed six questions about learning spaces he felt should be answered before a space is created:

1. What is it about the learning/research that will happen in this space that compels us to build a bricks and mortar learning space, rather than rely on a virtual one?
2. How might this space be designed to encourage students to spend more time studying and studying more productively?
3. For what position on the spectrum for isolated study to collaborative study should this learning space be designed?
4. How will claims to authority over knowledge be managed by the design of this space? What will this space affirm about the nature of knowledge?

5. Should this space be designed to encourage student/teacher exchanges outside of the formal classroom?
6. How might this space enrich educational experiences?

Additionally, Geoffrey Freeman (2005) devised a list of potentially helpful questions:

- How should the "library" and its services and its collections serve the institution?
- What programs not in the library at present should be in the facility in the future?
- How does the library add value to the academic experience of the student and faculty?
- How is the library presently perceived, and how can it function as an interdependent facility with other learning and teaching opportunities on a campus in the future?
- How much of the traditional library program must remain in a centralized facility?
- How does the library reflect the vision of the institution of which it is a part?

2.6.7 Other Online Tools

There are also many online tools that have been created. A few of them include:

- The Flexible Learning Environments Exchange (https://flexspace.org/)–an ever-growing database of member-submitted case studies. It allows users to "document and showcase learning spaces, share resources and best practices, work collaboratively with campus colleagues and partners, and connect with an ever-expanding worldwide community." It allows access to existing research and space renovation projects at various institutions.
- The Learning Space Toolkit (http://learningspacetoolkit.org)–designed with helpful resources for six stages of planning and implementing new learning spaces.

- The Society for College and University Planning (https://www.scup.org/)–designed for those involved in most aspects of higher education facility planning with easy access to various articles and resources.
- Learning Space Rating System (https://www.educause.edu/eli/initiatives/learning-space-rating-system)–"provides a set of measurable criteria to assess how well the design of classrooms support and enable active learning" and also provides access to resources related to information technology innovation.
- Service Model Canvas (http://www.uxforthemasses.com/updated-service-model-canvas/)–designed as a tool to specifically develop and document service models.
- Academic Library Building Design: Resources for Planning (https://acrl.libguides.com/buildingresources)–sponsored by ACRL (the Association of College and Research Libraries) and LLAMA (the Library Leadership and Management Association), this website provides information on various scholarly articles and resources that, if a researcher knows it exists, can be extremely helpful for research-based planning
- Learning Spaces Collaboratory (https://www.pkallsc.org/)–this website provides access to materials related to learning space development for the creation of physical learning environments designed to engage learners. It provides scholarly articles, access to notes from conferences, and case studies. LSC is sponsored by institutions like Flexspace (highlighted above), SCUP (highlighted above), and Educause (highlighted above).
- Whole Building Design Guide: Academic Library (https://www.wbdg.org/building-types/libraries/academic-library)–focuses on providing information for new-build

academic libraries. However, many design suggestions could be modified for existing library facilities.

- Project Outcome by ACRL (https://acrl.projectoutcome.org/)–provides resources and tools to create surveys and analyze outcome data for collections, instruction, research, teaching support, events/programming, library technology, and space.
- The Journal of Learning Spaces (http://libjournal.uncg.edu/jls)–a peer-reviewed, open-access journal dedicated to publishing articles "related to all aspects of learning space design, operation, pedagogy, and assessment in higher education."

2.7 Evidence-Based and/or User-Experience Design

Evidence-based design is a practice often employed in the development and the construction of healthcare facilities (Whitaker, 2018), but is also beginning to be utilized in other fields like elementary and secondary education. By definition, evidence-based design is "work that is informed by data from a variety of sources … and based on the best available information from credible research and evaluations of projects" (Hamilton, 2003). The purpose is to use reliable data gathered from others to improve the design of a facility. User-experience (UX) design is a term found in the technology world, often used in reference to user interfaces with software or websites. However, the three main principles of user experience design—producing something that is useful, useable, and desirable (Schmidt and Etches, 2014)—are also applicable to facility modifications. "Everything you do at your library—every service, every resource, every interface, every space—must satisfy all three elements of good UX or you're simply not optimizing the experience you could be providing to your members" (Schmidt and Etches, 2014). By using evidence-based design and/or user experience design when analyzing existing

library facilities, remodels, and services, library administrators can rely on the knowledge gained by others to avoid unnecessary mistakes or wasted efforts and time.

2.8 Research Objectives

With thousands of available pages of research and a wide variety of resources, it can become overwhelming for an administrator or librarian unfamiliar with facility needs, usability studies, or occupancy evaluations to decide on next steps. Needed facility adjustments can then become bogged down in indecisiveness and the political battles inherent in change. As Merrilee Proffitt et al (2015) described, "making incremental changes … allows the library to be maximally responsive." Using the information gathered from previously mentioned tools and cross referencing it with information gleaned from renovations already completed at different institutions, feedback from a panel of experts, and site visits to several universities, it was possible to create a new tool that can be used to self-analyze library spaces and identify immediate student space needs while on-going research informs future planning. This tool allows library administrators to determine those incremental changes in an informed, organized manner that can be tailored to a specific facility regardless of size or budget.

It should be noted that the tool was inspired by the Hierarchy of Learning Space Attributes, designed by Cunningham and Tabur (2012). With their work in mind, the author returned to Maslow's Hierarchy of Needs (1943) intent on discovering Maslow's original definitions of each hierarchical level. Reading Zaugg's library user persona publication (2016) sparked the idea of mapping personas (in place of Fred Kent's four principles for space desirability) to Maslow's hierarchy. This new and original persona/hierarchy mapping then allowed existing space- and strategy-related questions and space ideas to be sorted into

hierarchical categories, thus creating an evidence-based tool for academic library space analysis and improvement.

2.8.1 Objective 1

The first objective of this research was to identify how students are currently using library learning spaces. The following questions helped guide the research for this objective:

- What remodels have been completed in academic libraries in the last decade?
- Which of these remodels were successful? Why?
- Which of these remodels were unsuccessful? Why?
- How have pedagogy and technology changed the traditional academic library model?

2.8.2 Objective 2

The second objective of the research was to develop a tool that can be used by library staff to self-analyze existing academic library spaces, identifying areas that could be improved for student benefit. The following questions helped guide the research for this objective:

- What future changes does research suggest are important in academic libraries?
- Are there specific spaces that universally should be provided in any academic library?
- Can a reliable analysis tool be created for use by library administrators and staff?
- What would a tool look like?

3 METHODOLOGY

3.1 Qualitative Definitions

This study used a Delphi style approach and both grounded theory and ethnography. Grounded theory uses the views of participants to derive a general, abstract theory of a process. Ethnography involves the study of a cultural group in a natural setting, often collecting data via observations and/or interviews (Creswell, 2014). Observations were gathered via in-person visits to various academic libraries, and interviews were conducted via email, video conferencing, or in-person meetings with library professionals. A Delphi style approach seeks feedback from a group of experts, compiles information based on the feedback, and then seeks subsequent rounds of expert feedback as needed (Creswell, 2014). A panel of eight to twelve experts with two to three rounds of input is considered sufficient for this type of research (Hallowell and Gambatese, 2010; Sourani, 2014). This particular study used a twenty-person expert panel and two rounds of input.

3.1.1 Grounded Theory

Data was gathered through published articles and case studies and through interviews with a panel of twenty academic library experts (consultants, architects, and library professionals) in multiple US states. The author reached out to library experts asking for

feedback about essential twenty-first century library learning spaces. Library personnel qualified as experts if they self-identified as meeting two of the three following criteria:

- 10 years' or more professional work experience in/with academic libraries
- Significant involvement in at least one portion (planning, data gathering, construction, etc.) of a sizeable remodel in an academic research library ("Sizeable" equals greater than or equal to $50,000)
- Working knowledge of current pedagogy trends in higher education

It was assumed that these qualifications were broad enough to enable many different types of library personnel to contribute while also narrow enough that contributors would have working knowledge of library-related facility projects and/or the impact of pedagogy trends on the academic institution over time.

With the original goal of approaching at least one person from a four-year university academic library (public or private) in each state, the author reached out to facilities-connected library personnel at 39 institutions in 34 US states. The facilities connection was determined by job titles posted on library websites. If no job titles could be found, the author reached out to the University Librarian or Executive Assistant to the University Librarian requesting an appropriate contact. The author also emailed six architects known for working with academic libraries. With a response rate of 49% from library personnel and 17% from architects, a panel of twenty library experts was formed. Information was gathered from employees of four-year public and private institutions in Arizona, Connecticut, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Massachusetts, Missouri, Nebraska, New Jersey, New York, Nevada, North

Carolina, Ohio, Texas, Utah, and Wyoming, and also from one architect who specializes in library renovations.

Experts carried various titles: Library Head/Dean, University Librarian, Library Facilities Director/Manager/Coordinator, Head of the Facilities department, Director of Service Strategies, Assistant Dean of Libraries, Assistant University Librarian, Financial Manager, Director of Space Management, Assistant/Associate Professor, Principal Architect, Assistant Director of Teaching and Learning, and Assessment Librarian. By email, video conference, or in-person meetings, the author asked the experts to answer eight general questions:

- How can library space(s) be used as a tool to enhance student learning?
- What type of space might provide "discovery and delight" for a student?
- What are typical activities in which students engage in academic libraries?
- What are some remodels of which you are aware that have been completed in academic libraries in the last decade? Which of these remodels were successful? Which of these remodels were unsuccessful? Why?
- How have pedagogy and technology changed the traditional academic library model?
- What would a helpful space self-analysis tool look like?
- What would you describe as essential for a twenty-first century learning space?
- Are there specific spaces that universally should be provided in any academic library?

These questions were constructed to be open-ended and to gather information without inserting potential author biases. The geographic spread and combination of public and private colleges introduced a hypothetically diverse audience, while limiting the pool to four-year academic institutions provided needed specificity.

Inductive reasoning was used to organize and code the expert responses for common themes and descriptions of needed spaces. Those ideas were then sorted into an established space hierarchy created by the author when comparing Maslow's original definitions associated with the Hierarchy of Needs (1943) and an example of library-user personas developed by Zaugg et al. (2016). The analysis produced a persona-based hierarchical document of improvements (i.e. "if these space needs are met, attention may be moved to the next level on the hierarchy"). Questions gathered from previously mentioned research and other published sources (Peterson, 2005; Feinberg and Keller, 2010; Choy and Goh, 2016; Connaway, 2013; Deyrup, 2016; Fromet, 2016; Lippincott, 2010) were added to the appropriate hierarchical levels. Using a Delphi process (a structured communication technique which relies on iterative communication from a panel of experts), the hierarchical self-analysis tool including spaces, personas, and related questions was returned to the expert panel for final feedback and input. For the second round of feedback, experts were contacted via email and asked to read the document and answer the following questions:

- How does the information help you?
- How would you anticipate using this tool?
- What is missing?
- What is confusing?
- What additional background would be helpful?
- Are there other space recommendations that should be considered, and if so, what level of the hierarchy would you see those spaces occupying?
- Do you see any major gaps in the information?

Additional modifications were made to the hierarchical tool based upon expert feedback. The final product can be found in Appendix A of this document. Figure 3-1 shows a summary of the methodology used for this research.

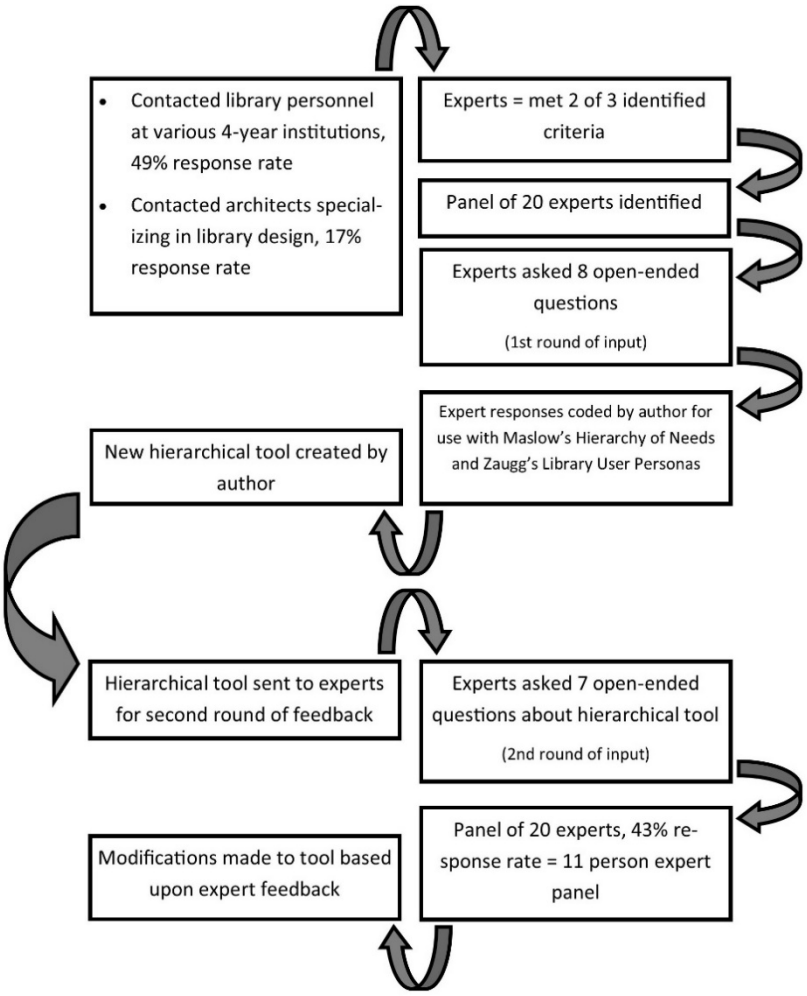

Figure 3-1. Methodology Flowchart

3.1.2 Ethnography

Some space ideas for the tool were developed via in-person site visits to several academic libraries in the United States. These visits occurred over a five-and-a-half-year time span, and

include academic libraries in Connecticut, Indiana, Iowa, Kansas, Massachusetts, Missouri, Nebraska, New Jersey, New York, North Carolina, Pennsylvania, Texas, Utah, and Wyoming.

Documents

If institutions wished to provide documentation about remodels and space assessments conducted, that information was also analyzed for further input into tool development.

Audiovisual materials

Photographs highlighting certain conditions or recommendations were taken for possible inclusion in case study information associated with the research. Care was taken to avoid including recognizable images of student library users at each of the visited institutions.

This particular study focused on existing academic libraries with aging facilities (as opposed to new-builds). While the end result might be applicable to all aging academic facilities, this particular study only focused on academic libraries. Future studies will need to be conducted to determine if the document is generalizable to other types of teaching facilities.

3.2 Internal Validity

To ensure internal validity of the tool and the process:

1. Data was collected via documents (literature review), interviews (panel of twenty experts), and observation (nineteen academic institutions).
2. The original results for the tool were examined by eleven peer editors currently part of the library profession, eight of which were part of the expert panel and three who were unfamiliar with the original questions.
3. This study's author was directly responsible for all phases of the study.

3.3 Potential Researcher Bias

Having been employed by a large academic library during a period of transition, this study's author understands the frustration and the complexity involved in planning for and implementing space changes in library facilities. There are many outlying issues surrounding space in libraries (e.g. organizational culture, librarian mindset, campus ecology, historical and emotional value of books). Oftentimes, the loudest voice in the room determines beginning and end point, and if the loudest voice happens to be against change in libraries, discussions are crippled from the start. Being of the opinion that libraries should reflect and support the needs of the current student body, the author specifically aimed to identify the most important space needs for twenty-first century students. These space recommendations may (or may not) be counterintuitive to traditional library spaces, but any suggestion made reflected the combined results of research and expert input, not the personal feelings of the author. All evaluation questions included in the final product have been either created by or derived from the input of library experts.

4 DATA AND INTERPRETATION

4.1 Expert Input

By email, video conference, or in-person meetings, the author asked twenty academic library experts to answer eight general questions:

- How can library space(s) be used as a tool to enhance student learning?
- What type of space might provide "discovery and delight" for a student?
- What are typical activities in which students engage in academic libraries?
- What are some remodels of which you are aware that have been completed in academic libraries in the last decade? Which of these remodels were successful? Which of these remodels were unsuccessful? Why?
- How have pedagogy and technology changed the traditional academic library model?
- What would a helpful space self-analysis tool look like?
- What would you describe as essential for a twenty-first century learning space?
- Are there specific spaces that universally should be provided in any academic library?

The answers to these questions were then analyzed for similarities, repetition, and unique insights. Of the 245 coded responses, 93 mentioned spaces, 91 highlighted resources, and 61 involved staff. Examples of spaces mentioned included areas for solo study, collaboration, socializing, eating/drinking, relaxing, writing, completing school projects, napping, caring for a child, attending events, and searching for information. Example resources included the digital

collection, the print collection, computers, printers, makerspace technologies, chargers, 3D printers, specialty software, video conferencing equipment, media production equipment, gaming equipment, and data visualization walls. Some comments sorted into the skilled staffing category included tutoring, Math Labs, Writing Centers, research assistance, information literacy training, advisement, technology assistance, and meeting with professors.

4.2 Success

One question asked the expert panel about remodels of which they had knowledge and if those remodels were successful or unsuccessful. This proved to be a difficult question for the experts and did not necessarily provide any guiding information for tool creation. Many of the experts mentioned difficulty in defining success. Is a project successful because it increases circulation statistics? … Because it increases the number of people within the building? … Because it spends all money allocated to the project? Interestingly, more than once, two experts mentioned the same remodel project, with one assigning the label of "successful" and the other assigning the label of "unsuccessful" owing to differences in their individual definitions of success. Another expert mentioned that library remodels are not often thought of in terms of success. If a remodel does not work as intended, it is simply remodeled again until it meets the original needs or is modified for another purpose entirely. Due to this discrepancy, the idea of a successful or an unsuccessful remodel is not addressed further in this research.

4.3 Pre/Post Occupancy Evaluations

One common piece of information mentioned multiple times during the literature review phase of research and by the expert panel involved pre and post occupancy evaluations. As such, information about these evaluations is included in a section of the hierarchical tool. Pre and post

occupancy evaluations are an essential part of 1) determining what changes are immediately necessary, and 2) evaluating if implemented changes were effective. This tool, at each stage of the hierarchy, encourages library administrators to conduct occupancy evaluations. To help guide those evaluations, some questions to consider before changes begin and after each change is implemented are:

- How successfully are students using the space?
- How does the student feel when he/she/they are using the space?
- Would the student return to use the space again? Why or why not?
- How many times per day/week/semester do/would the student use the space?
- Are students using the space as it was designed to be used?
- Are students using the space differently than the design intended?
- What furniture is being used and how frequently?
- What furniture is not being used?
- How often are the library-owned/provided technologies being used in the space?
- What is surprising to you about how students are using the space?

These questions will provide useful answers to help continually guide improvements in the right direction. It is also important occupancy evaluations be collected at different times of the day and during different times of the semester to be truly representative (Huse, 2020).

Additionally, institutions should consider answering some practical questions before beginning remodel discussions (Longmeier, 2020). These questions include:

- What is the issue you are trying to solve? Can the issue be solved without a remodel?
- How much money is available for a remodel/improvement?

- What is the available/expected time frame for the remodel?
- Will campus level approvals be needed for improvements?
- Will you need to fundraise?

The answers to these questions can be enlightening and can help determine applicable next steps.

4.4 Tool Creation

Once coded, expert responses were sorted into different categories based upon persona and hierarchy-related characteristics.

4.4.1 Persona Definitions

The personas used in this research were created by Dr. Holt Zaugg, the Assessment Librarian at the Harold B. Lee Library at Brigham Young University. Utilizing the assistance of students in an upper level communications class at the university, Dr. Zaugg (2016) studied library users and developed the following personas:

- ***Pirate***: patrons who view the library as a place of convenience with access to resources so that the patron is not required to provide those same resources. Pirates are typically associated with technology (software, computers, etc.).
- ***In-n-Outer***: patrons who view the library as a place to access services but do not want to spend any more time in the library than is necessary.
- ***Focuser***: highly motivated patrons who prefer to study in the library, alone and in quiet, with little distraction or possibility of interruption.
- ***Outsider***: patrons who use digital library resources without ever wanting or needing to come into the physical space.

- ***Collaborator***: patrons who work together, whether by requirement or by choice, on projects and/or class assignments.
- ***Sidekick***: patrons who draw energy and motivation from being in a group. They are social enough to want others nearby but focused enough to work on their assignments while surrounded by others.
- ***Islander***: patrons who have found and regularly use specific locations in the library. They are similar to other personas (like sidekick or focuser) but are differentiated due to their emphasis on location.
- ***Socializer***: patrons who see the library primarily as a social gathering place to meet old and new friends and not as an academic tool.
- ***Chillaxer***: patrons who blend work and pleasure in their use of the library with a strong balance between work (assignments, studying) and pleasure (naps, streaming movies, social media).
- ***Explorer***: patrons who visit the library searching for new knowledge and learning opportunities which may or may not be curriculum related.

Dr. Zaugg later collaborated with Dr. Donna H. Ziegenfuss, an Associate Librarian at the Marriott Library at the University of Utah, to determine if the personas would be applicable in another institution. That study (Zaugg and Ziegenfuss, 2018) provided evidence indicating these library user personas can carry across institutions.

It should be noted that library user personas are different than retail personas in that retail personas typically remain static whereas library user personas can change based upon the immediate need(s) of the library user. At one moment, the user may have limited time and an immediate need making s/he an In-n-Outer, while on another occasion a group assignment might

need completed making s/he a Collaborator. However, this library user might typically be an Islander—someone who has identified his/her "place" in the library and is most comfortable when studying in that location.

It should also be noted that personas will often have associated neighborhoods which can contribute powerful insight into multiuse space design. As Zaugg (2016) states:

> [The process of using personas for space design] uses the neighborhoods associated with personas to look for additional connections. For example, if a librarian notices Collaborators in a library space, he or she may also scan the area to determine if there are Side-Kicks in the same space or nearby. This helps to identify a library space that suits both personas. If no Side-Kicks are near the Collaborators, then the librarians may ask how the space could be changed to accommodate both. This process could also be used for flexible spaces where personas from different neighborhoods could come when using the library.

Because libraries need "to be different things to different people, and they all need to coexist in the same structure" (Vedantham, 2020), it is essential libraries be designed for a wide range of user needs and learning styles. Personas and persona neighborhoods can effectively assist library administrators in creating spaces designed to simultaneously meet the various needs of most library users.

4.4.2 Hierarchy Definitions

Abraham Maslow (1908-1970), a 20th century psychologist, postulated humans meet their needs based on a five level hierarchy. Heather Cunningham and Susanne Tabur (2012) superimposed Fred Kent's four characteristics of a desirable learning space over Maslow's Hierarchy of Needs to create the Hierarchy of Learning Space Attributes (see Figure 4-1), a broadly related space hierarchy.

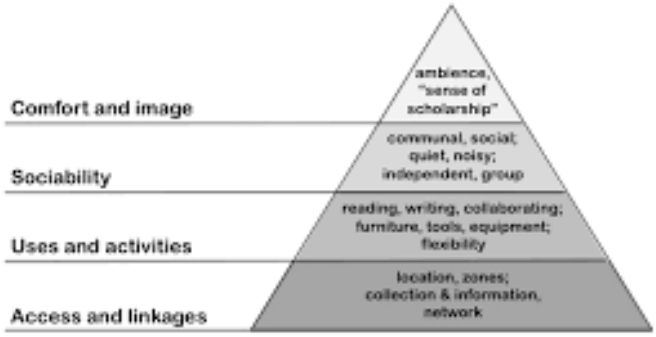

Figure 4-1. Hierarchy of Learning Space Attributes by Cunningham and Tabur (2012).

Leaning on Cunningham and Tabur's example for inspiration, Maslow's categories were again analyzed, this time attempting to more specifically define spaces using Maslow's original five level hierarchical definitions. Those categories as defined previously (see page 23) were cross-referenced with Zaugg's example of library user personas to establish a new interpretation for space hierarchy (see Figure 4-2).

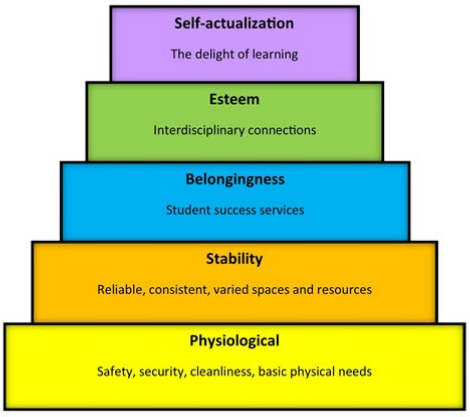

Figure 4-2. Hierarchical delineations as defined by this research.

The associated categories, retaining Maslow's titles, are defined by the author as:

- **Physiological**: This level is for the basic necessities of users—things like food, safety, clean restrooms, and shelter. These are the resources and spaces any user can and will likely utilize and are designed to meet immediate physical and academic needs of the user. Included in this level are Wi-Fi improvements, additional power outlets, comfortable interior temperatures, easily accessible computers and printers, generous food policies, and abundant advertisement and instruction for the digital resources provided by the library.
- **Stability**: This level is about order and stability. The focus is on providing an array of spaces and resources (physical and digital) to reliably and consistently meet the academic needs and the learning styles of a variety of users. Included in this level are spaces for collaborative study, solo study, studying alone while with others, deep quiet study spaces, and basic curriculum-driven technologies. This level also focuses on enhancing usability and access of digital resources.
- **Belongingness**: This level is designed to address the belongingness needs of users. The intent is for users to personally connect with someone or with something in the library, and the target is on providing spaces that allow for assistance, for comfort, and for connection. Included in this level are spaces for tutoring, socializing, collaborating, consulting, and teaching. There is also an emphasis on providing furniture that meets a variety of physical comfort needs and on flexible spaces designed to be rearranged to meet the current needs of individual users.
- **Esteem**: This level is to recognize and highlight achievement. Space decisions begin to focus on faculty, student, and library personnel achievements and expertise.

Included in this level are exhibit spaces curated by students, spaces designed to teach from primary resources, faculty-focused spaces, and areas designed to allow for serendipitous connections between faculty and between faculty and students.

- **Self-Actualization**: This level emphasizes the fulfillment of personal potential. The purpose is not necessarily to create specific, curriculum-driven spaces, resources, or technology, but the spotlight is instead on the delight of learning. These are spaces that provide for exploration and discovery, and are designed to allow a user to find joy and excitement in things other than his or her class assignments. Included in this level are cutting-edge technologies, public outreach events, and spaces for film screenings, faculty lectures, gaming, student conferences, and galleries.

4.4.3 Physiological

The key characteristics of spaces designed for the lowest hierarchical level are safety, security, cleanliness, and basic physical needs. These spaces will align with the Pirate and the In-n-Outer personas, users who want to take advantage of the easily available resources the library offers but do not necessarily seek to find a place of their own within library walls. These spaces are designed for library user convenience, but they will also draw users to the library facility. Space suggestions for this level of the hierarchy meet basic physiological needs like food and drink availability, diaper changing stations for parent-students, and clean restrooms. Additionally, it allows for increased electrical outlets and robust Wi-Fi coverage, especially in main thoroughfares and popular seating areas. This level also investigates life safety features (fire sprinklers, seismic infrastructure, emergency evacuation chairs, security, etc.) and ADA compliance issues.

Some space-related questions that can guide space analysis are:

- Is your space safe? Do you have any dark corners or hidden spots that create danger?
- Can site lines be improved for safety?
- Where can or should security cameras/panic buttons be added to improve the safety of staff and/or library users?
- Is your building clean?
- Are your bathrooms in good repair (and clean)?
- Do you provide some access to food/drink? What is the food/drink policy, and should it be revised?
- Are the physical needs (food, drink, safety, biological needs, etc.) of a student adequately met to allow for a long stay in the library?
- Do you have places you can or should add electrical outlets (every four to eight feet or available at every seat)?
- Does your Wi-Fi need to be boosted?
- How is the light in your building? Can you add more windows? Can you improve the lighting fixtures?
- Is there natural light easily available to students/library users?
- Is the space temperature correct?
- Do you offer spaces friendly to student-parents? Is this a space need of your campus community and/or library users?
- What ADA improvements are needed to allow access to your building, your collections, and your services? Can you be better-than-compliant?
- Is the space easy and convenient to access?

In conjunction with those questions, some specific space suggestions include:

- A generous food policy
- Vending machines
- Water bottle fillers
- Improved Wi-Fi
- More power outlets
- Baby changing stations in all restrooms
- Clean/durable/upgraded restroom facilities
- Drug and safety trainings
- Security cameras/panic buttons
- Easily accessible public computers and printers
- Proper and prolific advertisement of electronic resources and how to access them
- Quality janitorial staff and equipment
- Lactation rooms
- Ability to remove barriers to open safety site lines
- ADA accessibility improvement needs
- Adequate life-safety features (sprinkler systems, emergency evacuation chairs, etc.)
- Gender neutral/family friendly restrooms
- Family-friendly study rooms
- A café/coffee shop
- HVAC improvements

While these improvements are not necessarily the shiny, bells-and-whistles remodels some might have in mind, these are the backbone of a popular and well-used building. A clean

restroom might seem unimportant, but if the library becomes known as the place with the cleanest restrooms on campus, students (and faculty) will come into the facility. Once inside, users can be exposed to other quality spaces and resources beneficial to their academic pursuits.

The Keith and Dolores Stirling Family-Friendly Study Room at the Harold B. Lee Library at Brigham Young University (BYU) is one example of a potential physiological level space improvement. Approximately 25% of the student population at BYU are student-parents with many students, especially females, leaving school after becoming parents (Paustenbaugh and Belliston, 2018). Library administrators decided to provide for this underserved student population by creating a space inside the library where children were welcome and parents could provide care while also attending to their academic responsibilities. The space (see Figure 4-3 and Figure 4-4) has been enthusiastically received by library users, and a post occupancy evaluation provided additional insight regarding the library's positive impact on individual students and their academic success because of the family-friendly study space (Graff, 2018).

Figure 4-3. Play structure in the family study room, Lee Library, Provo, Utah. There are two glass-enclosed, technology enabled group study rooms behind the play structure.

Figure 4-4. Play areas in the family friendly study space, Lee Library, Provo, Utah. There are spaces designed for toddlers and an enclosed location (behind and to the right of the play structure) designed to be safe for infants to play.

Cunningham Memorial Library at Indiana State University in Terre Haute, Indiana, meets the physiological needs of library users by feeding the students during finals week. From 2:30 PM until 7 AM each night of finals week, the library offers coffee, hot chocolate, juice, soda, fruit, granola bars, peanut butter and jelly, bagels, and other grab-and-go type food to library users immersed in their finals preparations (Middleton, 2014). A multipurpose space on the main floor of the facility is used, and any are welcome to the food and drink. This goes along with their student-centered library motto: "Your Campus Living Room".

Finally, when administrators seek student input, far more often than not, there are four improvements mentioned repeatedly as desirable: food availability/cafes, more electrical outlets, better Wi-Fi, and improved lighting (natural and artificial). When these items are not adequately

met, they can hinder any other helpful discussions about space improvements, thus making these types of improvements part of the physiological level of the hierarchy.

Included in each hierarchical level of the tool are strategic administrative responsibilities. These incorporate suggestions of essential information to gather and policy questions to answer in preparation for future discussions about space solutions found in higher hierarchical levels. For the Physiological level, recommended essential information consists of:

- Gathering data about current space usage, e.g. technology usage and requests; furniture, areas, or items that are not being used as originally intended; when and where electrical cords are placed across walkways or furniture is relocated; consistently well-used or underutilized spaces or furniture
- Identifying mechanical locations—these tend to be non-negotiables due to extreme expense associated with relocating them
- Learning about Post Occupancy Evaluations, what they are, and how to conduct them
- Beginning focus groups and individual interviews with student users to discuss needs and wants for library spaces, services, and resources
- Completing a current HVAC load analysis
- Completing a structural analysis of the building to determine potential future locations of stacks and compact shelving

Some questions to help guide policy-related discussions are:

- What is the mission/vision of your library? How do the spaces, resources, and personnel decisions connect to that vision?
- How does the library fit into the campus ecology? This includes knowledge about the

pedagogy, learning philosophies, and style of the institution. How should the library, its services, and its collections serve the institution? How does the library contribute to the vision of the institution?

- How is the library presently perceived by faculty, administration, and students?
- Have you included faculty and campus partners in focus groups and discussions, especially in regard to collection changes?
- Have you determined a campus communication strategy regarding library changes to ensure buy-in from faculty and campus administration? You may wish to consider creating strategic faculty "ambassadors"—faculty library users willing to return to their departments and share information/explain the library's vision to naysayers.
- How does the design of the library match the university's claim of authority over knowledge? If the university is fully ensconced in "teachers teach, and students learn" ("sage on the stage"), then the designs should embrace that. If the university is pushing to a different model—active learning/blended learning ("guide on the side")—the designs should embrace that.
- Are there any accreditation requirements for libraries from your regional accreditor?
- What are the non-negotiables? (Example: the same number of books must remain in the space, all librarians must have offices, etc.)
- Does your library provide an equitable success outcome for all intended users? Why or why not? Can any identified inequities be resolved using space?
- What technology capabilities can your staff support?
- How much funding is available for the renovation and/or the technology?
- What is the service strategy moving forward? Does it include one or many service

desks? ... 24/7 service or something else? ... Offices for all staff/administration or just some? Etc.

- Is the space plan informed by the service/programming design rather than vice versa?
- Do all on-site services, staff, and assets need to remain onsite to enhance learning and productivity? How much of the traditional library program must remain in a centralized facility?
- Does the collection size match the curriculum-specific needs of the institution?
- Are your staff adequately trained for emergency situations (violence, drug use, medical emergencies, natural disasters)?

Having answers to these questions can forestall conflict when discussing future space ideas and proposals. It is essential to honor the mission and vision of the library in any remodel, but if the vision of the library is at odds with the vision of the institution, a space remodel may be underutilized and viewed as wasteful. If a space remodel proposal falls outside of the mission and vision of the library, it becomes an easy idea to weed from the list of potential uses. Space improvements deemed essential in one academic library might not be successful or needed at another due to unique campus ecologies. Again, gathering this information during the physiological stage of the hierarchy can alleviate future headaches and political drama regarding space decisions.

4.4.4 Stability

Providing a variety of space and resource options designed to consistently meet the needs of library users with multiple learning styles is the key characteristic of spaces designed for the second level of the hierarchy (Stability). These spaces will align with the Focuser, the Outsider,

the Collaborator, and the Sidekick personas. These individuals use the library for a variety of reasons, and because of the focus on creating an abundance of space types and providing robust digital resources, multiple needs are met simultaneously. Adding electrical outlets and strengthening the Wi-Fi remain important and should be part of any remodel. Also, continuing to provide for physiological needs in any space improvement is requisite. However, administrators now focus on expanding library space offerings to include many different types of spaces to meet the varied demands of their library users. Flexibility also becomes an important focal point. Libraries are ever-changing, and it is difficult to predict the future. Therefore, build walls only when necessary, and carefully consider quality levels (i.e. does it need to last forever or to last a few years).

Some space-related questions that can guide space analysis in this hierarchical level are:

- Are you adding more electrical outlets when and where possible?
- Are you continuing to improve Wi-Fi access?
- Does this change reduce the friction/distance/inconvenience between students and the information they need?
- Are the interfaces in the space simple and intuitive?
- Is the space easy to maintain? Is that important to your organization?
- Does the "stuff" need to be attached to the structure?
- Does the technology meet the immediate needs of students?
- How often will the technology need to be replaced?
- Does the space intentionally encourage the user to remain on task?
- Is there quiet space, designed to accommodate deep dives and long study sessions?
- How might this space be designed to encourage students to spend more time studying

and studying more productively?

- Who are the primary users of the space?
- Is the learning that currently happens in this space independent of time and place? If so, does it need a brick and mortar location? (example: mobile apps, digital collections/access, etc.)
- How many students are using the space currently? How many students is the space being designed to accommodate? How many students do you want to use the space at one time?
- For what position in the spectrum from isolated study to collaborative study should this space be designed?
- What types of activities do you want/not want happening in this space?
- What does the space design communicate to the user? What behaviors and outcomes are wanted from student use of the space?
- Is the amount of space right for the intended programming?
- Is the noise level right for the intended programming?
- Is the crowdedness right for the intended programming?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?
- Are there traditional library spaces offered?
- Have you incorporated special things about the space that share the history and the legacy of the building and the institution?
- Does the space allow for diverse talents and ways of learning?

- Can the space be used for multiple purposes?
- Are multiple types of space offered within the library walls?
- Is there enough space for group work?
- Are students free to move through the space? … to rearrange the space? … to socialize in the space?
- Are there barriers between students and staff? Are those barriers intentional? If not, can the barriers be removed?
- Does space design make it difficult for students to find and/or approach library staff?
- Do post-occupancy studies support the changes or are other changes necessary? What are the observations showing about space usage?
- Does space design encourage students to seek out assistance when needed?

The number of questions related to this level illustrate the complicated nature of providing a variety of spaces in one facility. The effort requires a significant amount of analysis, thought, and student input to use space renovations and monies in the most impactful ways for the library and the sponsoring institution. There can be some trial and error, but if administrators honestly seek answers to these and other facility related questions, space changes should be meaningful, be useful for library users, and provide essential building blocks for future hierarchical improvements.

In partnership with these questions, some specific space suggestions include:

- Individual study spaces
- Study carrels
- Book-surrounded study spaces
- Deep quiet study spaces

- Nooks with seats, power, and Wi-Fi access
- Basic, curriculum driven technology (calculators, cameras, specialty software, TVs)
- Meditation/prayer rooms
- Collaboration spaces with and without technology
- Flexible spaces
- Spaces designed for multiple uses
- "Traditional" library spaces (great halls, large tables, book display shelves, etc.)
- Fire places, murals, well-preserved or restored areas that share the uniqueness and history of your facility
- Improved content access, both digital and physical
- Easily accessible physical, digital, and human resources

A few of the most interesting insights about library users can be found in this second hierarchy level. Students still enjoy the books found in a library, and they often mentally associate books with scholarship and academia. However, they do not use books in quite the same way as previous generations. Circulation statistics support the idea that students are more likely to use digital resources than physical copies of the same material. However, students want to be surround by books as they study. This is a "Hogwarts" generation, and many library users associate university libraries with vast great rooms, high ceilings, intricate murals, large tables, and book lines walls. At the same time, they crave nooks and small spaces, accessible technology, and knowledgeable staff. It can be difficult to balance the seemingly contradictory needs of student users, but it is possible.

One example of a creative way to honor library traditions while creating useable space comes from the Firestone Library at Princeton University. Firestone recently completed the final

phase of a ten-year remodel that saw the entire building gutted and rebuilt (Vedantham, 2020). In that process, card catalog drawers—relics of another time in library history—were used to create a magnificent accent wall (see Figure 4-5) by the one service desk in the building. This offering beautifully pays homage to library history while not being held hostage by old processes or space requirements. Administrators and designers also chose to repurpose what had been a faculty office into two delightful group study rooms (see Figure 4-6), allowing students to find a bit of magic in a space not previously designated as student space.

Another example of a successful "stability" space renovation comes out of the University of North Carolina at Greensboro. Library administrators recognized student needs for light, electricity, privacy, and flexibility. In order to meet all of those needs with minimal financial impact, they invested in some Agati Roland Nook Study Carrels (Crumpton, 2020). These all-in-one study carrels provide private space, a built-in light, power outlets, and comfortable seating. They can also be purchased on wheels, making them easy to relocate. While this might not be an acceptable solution for every library, it is an example of thinking outside of the box to meet student space needs.

Finally, Butler Library at Columbia University provides an example of a tremendous undertaking to preserve and yet reframe a traditional library space to meet the needs of current students. The Grand Reading Room in the Butler Library (see Figure 4-7) is a popular space for silent study. The ceiling, a work of art from generations past, was restored. HVAC was added, concealed behind meticulously built-out historical shelving. Power was added in the flooring, and a large, underutilized service desk was removed from the center of the space to make room for more student seating. When finances ran low, cheaper tables were purchased to mimic the look of the existing furniture until additional funding could be secured to match the tables

(Locascio, 2020). This is an example of determining the items of most worth to the students and the institution, and then finding a way to implement those changes in a forward-thinking manner.

Figure 4-5. Card catalog drawer accent wall, Firestone Library, Princeton, New Jersey.

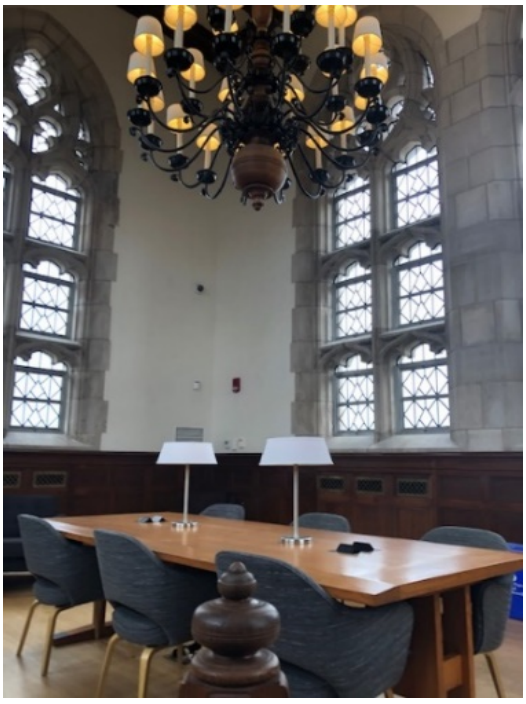

Figure 4-6. Tower group study room, Firestone Library, Princeton, New Jersey.

Figure 4-7. The Grand Reading Room, Butler Library, New York City, New York.

This level of the hierarchy gives administrators the chance to look at services and current space usage to determine what actually needs to stay within the building. Strategic administrative responsibilities with this level include:

- Solidifying the post occupancy evaluation strategy
- Performing a detailed analysis of focus group and individual interview responses, creating an informative and guiding tool about users' needs/wants
- Conducting post occupancy evaluations of any space change
- Determining a wayfinding/signage strategy

The information synthesized during this stage of the process allows academic libraries to embrace the spaces most important to library users, but it also pushes administrators to focus on library user needs and abandon unhelpful, unneeded, or unwanted legacy practices and spaces.

Additionally, administrators should determine a wayfinding and signage strategy which will be included in all space modifications made during the Stability level of the hierarchy and above.

Some guiding questions that can assist during this stage are:

- Are you honoring the mission/vision of the library with the things you are changing/leaving the same?
- Are you continuing to keep in mind and providing for the physiological needs of the users? Are you including those things in any remodels/improvements?
- Are you emphasizing forward-thinking and future-proofing strategies during space-related discussions?
- Do you want to encourage napping in the library (space and furniture implications)?
- What is your comprehensive wayfinding/signage strategy?
- Do you want to use color schemes, carpeting, etc., as part of your building-wide wayfinding strategy?
- Are you conducting post occupancy evaluations with every change?

Creating a variety of spaces for use by diverse library users enables an easier transition as administrators move higher up the hierarchy. Once improvements occur at the Stability level, the academic library is poised to become an essential tool for campus colleagues, both student and faculty.

4.4.5 Belongingness

Belongingness is the hierarchy level where, when complete, library administrators have successfully provided useful and desirable spaces for 95% of library patrons (Zaugg, 2016). Key characteristics of spaces in this third level focus on student success. Because of the variety of

spaces, resources, and staffing, this level recognizes the unique needs of library users and provides a majority of them something of personal value in the library. Applicable personas are the Socializer, the Chillaxer, and the Islander. The Islander is actually the most prolific library user persona (Zaugg, 2016) and represents the person who finds his or her 'place' in the academic library. Different zones endorse a spectrum of noise levels to meet the various needs of users, from those who require deep quiet to those who come to the library seeking friendship or romance. Spaces are designed to accommodate everything from large groups to the single student, and services are focused on the success of the student. This level also focuses on providing different styles of furniture and enhancing technologies.

Questions designed to guide library administrators through this phase consist of:

- Are there different furniture types, sizes, and aesthetic colors provided?
- Are there a variety of spaces and furniture to meet personal and varied student needs?
- Is the furniture flexible? Can it be moved or rearranged? Is the flexible nature of the furniture obvious to the user?
- Is the comfort of furnishings right for the programming?
- Does the space encourage contact between student and staff?
- Does the space help develop reciprocity and cooperation between students?
- Should this space be designed to encourage student/teacher exchanges outside of the formal classroom?
- Are there spaces for faculty and students to experience planned and serendipitous academic-related encounters?
- What type of collaboration is happening in the space? Student to student? Student to staff? Staff to staff? Faculty to faculty? Partner to partner? Is that the intended

collaboration? Does the space design adequately meet those needs?

- What learning and teaching scenarios will happen in the space?
- Can the space be easily and quickly reconfigured to meet the needs of the identified learning and teaching scenarios?
- Is the learning that happens in the space dependent of place and dependent of time? Is the right place for this space in the library? (examples: classrooms, makerspaces)
- How often will the technology need to be updated?
- Do existing staff have the necessary skills to assist patrons with their needs (technology, research, production, etc.)?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?

Since diverse spaces were created in the second level, the focus in the third level is improving areas of the library by adding unique furniture and services. The emphasis is on providing somewhere, something, or someone library users can claim as essential to their academic career, forging an emotional connection and a feeling of personal belonging inside library walls. The academic library should be part of student success and needs to be open and useable for a variety of different purposes. Space suggestions for this hierarchical level include:

- Tutoring spaces
- Social gathering spaces
- In-depth consultation spaces
- Moveable whiteboards
- Presentation practice space

- Flexible/moveable furniture
- Variety of furniture options (not wood chairs)
- Training (staff and student) for enhanced technologies
- Enhanced, curriculum-driven technologies
- Makerspaces
- Graduate student spaces
- Video and audio studios
- Library instruction space
- Writing Centers
- Math Labs

When asked what type of space might create discovery and delight for a student in an academic library, Beth Boatright from Florida State University said, "what defines delight is to find a space that is made with you in mind" (Boatright, 2020). This is the core of the Belongingness stage of remodels.

An example of creating a space that inspires belonging can be found at the Love Library at the University of Nebraska-Lincoln, and it was as simple as the strategic placement of a whiteboard. A group study room was created using moveable walls, and some existing soft furniture was arranged outside of the study room (see Figure 4-8). The interesting feature, though, was the whiteboard on the outer wall of the group study room. This whiteboard created essentially a second group study space, only this space was in the open and had soft furniture as opposed to being surrounded by walls with the customary table and hard chairs. Additionally, this allowed students to share their work openly with passers-by, creating an atmosphere of learning and of collaboration.

Figure 4-8. Group study space options, Love Library, Lincoln, Nebraska.

Butler Library at Columbia University created a unique space not by remodeling but by allowing a space to remain untouched. Outside of one of its more traditional reading rooms, there is a stairwell in a small back hallway (see Figure 4-9). This stairwell leads to a few small alcoves above the reading room, and reports are the alcoves are popular with students (Locascio, 2020). However, the stairwell creates its own sense of delight and mystery due to location and feel. It whispers to wandering students of hidden adventures and secret cubbies, and that alone can create a magical and emotional connection to the library for a library user. Its existence also communicates a sense of exploration, encouraging students to find other space treasures in random corners and side hallways.

The Harold B. Lee Library (HBLL) at Brigham Young University completed a successful Research and Writing Center (RWC) space pilot, an extension of the official Writing Center located on the 4th floor of a different building, on the main floor of the library. Assessment determined the RWC outgrew its allotted space shortly after opening due to heavy usage. After a

year of assessment, the decision was made to relocate the entire Writing Center, including administrative staff, to the HBLL. A bigger space was designed to accommodate a larger number of users, and the Research and Writing Center now exists exclusively in the library, conveniently located on the main floor directly adjacent to the circulation desk.

Figure 4-9. A magical stairwell, Butler Library, New York City, New York.

Administratively, most of the strategic questions have already been answered during the hard discussions associated with the first and second tiers of the hierarchy. However, it is important to continue conducting post occupancy evaluations of every space change. It is also essential to evaluate every space decision, ensuring it aligns with the mission and the vision of

the library and of the space. Spaces must likewise continue to meet the physiological and stability needs of library users with any facility changes.

4.4.6 Esteem

No specific persona is highlighted in the fourth hierarchical level, Esteem, although space improvements continue to enhance the experience of all previously mentioned personas. Parts of personas likely fit within different levels of the hierarchy, depending on the context; however, the personas are fit into categories based upon best *overall* fit. According to Maslow (1943), Esteem is about seeking the approval of others, and none of the identified example library user personas best fit within that definition. However, it is still an important tier in the development of space. Library users are not necessarily driven by Esteem, but they benefit from spaces designed to seek or to inspire Esteem. Key characteristics of this tier focus on creating interdisciplinary connections. This level is designed to recognize and highlight achievement. Space decisions begin to focus on faculty, student, and library personnel achievements and expertise. Included in this level are exhibit spaces curated by students, spaces designed to teach from primary resources, faculty-focused spaces, and areas designed to allow for serendipitous connections between faculty and between faculty and students. Library administrators contemplate faculty space needs related to the library and pedagogy and strive to construct harmonious and helpful relationships and spaces. Advantageous questions to consider are:

- Does the space design allow students the ability to easily show or tell library staff about student's thoughts and opinions?
- Does library space allow for tactile learning, visual learning, regurgitation, primary research, etc.?

- How might this space enrich educational experiences?
- How does the library add value to the academic experiences of student and faculty?
- Is there a space for faculty to mix with peers of other disciplines? Is the library the right space for that?
- Is the learning that happens in this space dependent of place but independent of time? Is the right place for that in the library? (examples: AR/VR, interactive exhibits, etc.)
- Is the learning that happens in this space independent of place but dependent of time? Is the right place for that in the library? (example: webinar/distance learning spaces)
- Does the space use active learning techniques? Is it appropriate for the institution? Is the right place for that in the library?
- What is it about the learning/research that will happen in this space that compels you to build a brick and mortar learning space rather than rely on a virtual one?
- How can the library function as an interdependent facility with other learning and teaching opportunities on campus in the future?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?

Spaces incorporated into the library during this phase involve:

- Classrooms for librarians to teach their expertise
- Spaces that encourage interdisciplinary interactions
- Exhibits curated by students and faculty
- Poster sessions by students

- Displays of student work
- Mixed staff and student space to create more natural interactions
- Faculty-focused spaces
- Spaces to teach from primary resources

The Esteem level is where the library starts to show off collections, faculty, students, and personnel. Library users are comfortable with the library facility and staff, and library staff are comfortable with all the interesting tidbits the variety of library users add to the essence of the academic library. Examples of Esteem level improvements include Firestone Library's (Princeton) shelving area designated for new faculty publications, Thompson Library's (the Ohio State) relocation of significant Special Collections exhibit space to the main floor, and Lee Library's (BYU) Experiential Studio, a classroom space designed to accommodate multiple disciplines working together to create a unique learning experience (shown in Figure 4-10).

Figure 4-10. Experiential Learning Studio with multiple technology stations, two break out rooms, and maker supplies, Lee Library, Provo, Utah.

Administrative decisions consist of conducting post occupancy evaluations, safeguarding adherence to the mission and the vision of the library, and confirming needs from the previous three hierarchical levels continue to be satisfied. With 95% of library users content with space offerings, now becomes the time to focus on strategic partnerships moving forward. A question to help spark discussion is:

- What is your plan for evaluating and deciding on space requests from campus entities outside and separate from the mission and vision of the library? Is there information within the hierarchy and the personas that could provide evidence for or against those potential partnerships?

With any decision of what to bring into the library, there will be political pushback from inside and outside of the library regarding what has to be moved out of the library to make room. It is essential to have a transparent and consistent plan/policy about partnerships in preparation for the next hierarchical level.

4.4.7 Self-Actualization

The fifth and final level of the hierarchy, Self-Actualization, emphasizes the fulfillment of personal potential. The purpose is not necessarily to create specific, curriculum-driven spaces, resources, or technology, but the spotlight is instead on "the delight of learning" (Zaugg, 2020). These are spaces that provide for exploration and discovery, and are designed to allow a user to find joy and excitement in things other than his or her class assignments. The applicable persona is the Explorer, a person who seeks new knowledge and learning opportunities independent of assignment or of responsibility. Spaces created in this tier are not necessary to qualify as an efficient or effective library. Having met the physiological, stability, belongingness, and esteem

needs for patrons, administrators can now focus on spaces and things that can contribute to delight, whimsy, and joy for users as they navigate the academic landscape. Important questions to ask about space changes in the Self-Actualization tier are:

- Do all services, staff, space, and assets enhance learning and productivity?
- Does the technology encourage discovery and exploration?
- Does the space communicate high expectations for scholarship and achievement?
- Are the students surrounded by the academic triumphs of others?
- Are the university and its members (past and present) showcased?
- Are quality works exhibited and made available for student viewing and access?
- Is the space environmentally friendly?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?

Included in this level are cutting-edge technologies, public outreach events, and spaces for film screenings, faculty lectures, gaming, conferences, and galleries. Specific space suggestions include:

- Public outreach (beyond the university)
- Art
- Gaming locations
- Color
- Galleries
- Cutting-edge, exploratory technologies (not necessarily curriculum-driven)

- Artificial intelligence labs
- Virtual and augmented reality spaces
- Aesthetics/creating spaces that inspire
- Workshop/conference space
- Auditoriums
- Group film-screening locations

Again, the lack of these spaces will not inhibit a library from being a vital part of students' higher education experience. These spaces may be out of the realm of possibility for some institutions due to finances or space limitations, and that is okay. By meeting the needs of at least the first three levels of the hierarchy, academic libraries are making a significant difference for their users. Maslow felt that most people never reach the self-actualization level of existence (Maslow, 1943), and many libraries will also not be able to completely fulfill all of these space needs.

A couple space examples for this level include the data visualization wall at North Carolina State University and the CURVE (Collaborative University Research and Visualization Environment) at Georgia State University. Olin Library (Washington University-St. Louis) created a special exhibit to permanently display their copy of the Southwick broadside Declaration of Independence. The Lee Library (BYU) holds the Motion Picture Archive series each year, presenting original reel-to-reel classic movies from the Motion Picture Archive collection. It could successfully be argued that none of these spaces or services are mandatory for an academic library. However, they do create moments of self-actualization for library users.

Administratively, the one final consideration (beyond conducting post occupancy evaluations, continuing to recognize and meet the space needs from the previous levels, and

honoring the mission and vision of the library) is to strategically consider what programs currently not in the library should be relocated to the facility, what partnerships should be nourished, and to analyze the space implications for these possible changes. The policy created during the previous tier will help guide these discussions, but the discussions are likely to produce some negative responses in some. It is essential to openly acknowledge necessary sacrifices and to emphasize the future positive impact for students as administrators navigate the tricky waters of change.

4.4.8 Construction and Estimating Tips

Facility and construction management is not often a topic covered in library school, but library administrators are continuously pulled into the facilities world due to the ever-changing nature of the academic library. This section of the tool was designed to provide helpful construction and estimating tips for use by library administrators as they assemble a plan and discuss practical spaces and potential costs. The information was intended to be generic but informative, showing approximate order of magnitude costs associated with potential changes. Figure 4-11 shows the general costs that are provided in the library space tool for the proposed ideas. Some information was gathered through interviews with a journeyman electrician (Cowan, 2020) who has worked on residential and commercial builds, a structural engineer (Nelson, 2020) with more than 20 years of work experience at a large academic institution, and an academic library facilities manager who also has previous work experience as a general contractor (Stewart, 2020). Other information was obtained through the author's research, education, and work experience.

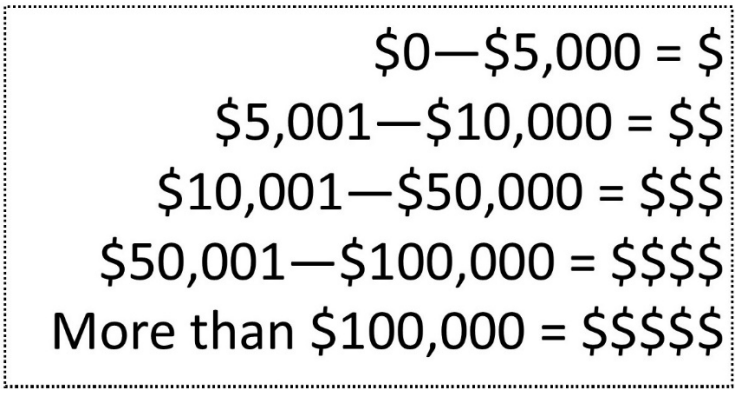

Figure 4-11. Order of magnitude cost legend included in hierarchical tool.

Structural information can be helpful due to the push for more efficiency in the storage of physical collection materials. Compact shelving creates heavier live loads than standard shelving, and some areas of an existing building may not/will likely not support the weight. It is essential to know where compact shelving can and cannot be installed. Additionally, seismic codes have changed significantly in the last 50 years (Nelson, 2020). For life-safety reasons, it is important to know what improvements are needed for the stability of an existing structure.

The demand for increased electrical infrastructure is consistent across a majority of existing academic facilities as evidenced by the number of times it is mentioned in the literature, by experts, and in student surveys. Knowing the costs associated with adding electrical outlets to an existing structure is essential. Additional background information about circuits, panels, wiring type, and building service provide for a better-informed discussion about the financial cost of adding more power, more technology, and bigger equipment to an existing facility.

Improvements to wireless connectivity is also a heavily desired change (again, as evidenced by the frequency of mention in literature, by experts, and in student surveys). Practical information about adding wireless arrays, while generic and gathered from only one

institution (Ralls, 2020), is designed to provide a ballpark number ($950 per array) when discussing the costs associated with that type of an improvement.

Access to existing building codes is also important. Library administrators end up in conversations with architects, contractors, and tradesmen, and administrators can feel or be uninformed in this area. While knowing the codes is not necessary, being able to access the codes to verify information or be an active participant in discussions is important. The International Code Council has created a website designed to permit visitors access to building codes based upon state and, where applicable, county or city. This resource, found at https://codes.iccsafe.org/, can be helpful for library administrators.

Each institution will likely have representatives and/or policies associated with remodels and funding. It would be difficult to represent specific potential setups in one overarching, generic document. However, if the University Librarian and/or facility manager is unaware of whom to contact or of policy details (example: some institutions have policies about mandatory campus or board approval for renovations over a certain amount of money), administrators should begin asking questions up the reporting chain until the correct connections are made and information gathered.

4.5 Tool Feedback and Editing

After the author created the original hierarchical tool for this research, a copy of the document was emailed back to the original panel of experts and three additional library experts unassociated with the original panel. Experts were asked to answer the following questions:

- How does this information help you?
- How would you anticipate using this tool?

- What is missing?
- What is confusing?
- What additional background information would be helpful?
- Are there other space recommendations that should be considered, and if so, what level of the hierarchy would you see those spaces occupying?
- Do you see any major gaps in the information?

A 43% response rate led to an 11-person panel of library experts providing feedback on the tool draft. Overall, the tool was deemed successful, and multiple responses were provided on how it could be helpful to others, including:

- It's a helpful checklist of various considerations for assessing and improving library learning spaces.
- The information is helpful for facilitating conversation with different levels of library staff and helping talk about why changes are being proposed or implemented.
- This document gave me insights on how to work through the cost analysis of a project. There were things I did not realize that the tool helped out.
- I think it is an interesting approach and could be useful at the start of a project or when planning assessments. I think very few projects try to gather assessments of space usage after projects are complete, so that is a useful tool in some cases. In other cases, you receive funding that has to be used in a certain time frame and so the success measure is, did you spend the money.

- I found the information about the library user personas especially useful. The questions provided are thought-provoking and allow the tool to be easily adapted to each situation/institution.
- Helps me think about library space in terms of student needs.
- I love that you include post evaluation, as well. It speaks to how space projects are never really done and if you plan them right, you can and should continue to adjust and change.

When asked how they might use the tool, experts were also generally positive about the tool's usefulness.

- As a quick reference list when conducting assessments or planning new spaces.
- I would use this tool to initially consider the feasibility of new ideas for space and service in the building. Specifically, I think it can expose disconnects between administrators and patrons.
- I think that the tool would be particularly helpful at the ground level. If someone in a department or office wanted to make a change, it would help them work through the change to see how it would impact the library and the value it would add.
- I'm not sure. It seems like it would be useful for a team to use. … It currently feels a little like a catch-all right now but not everyone on the team would care about all parts of the tool.
- It looks great and would be very helpful for a director/dean to share with a startup team and educate them on the nuances of engaging such a project.
- I would use this tool for renovation ideas in particular and I think the questions are great to stimulate thinking and what ifs.

- I can see this being very helpful to those just starting to consider renovation.
- This tool would be extremely useful to staff and administrators who are getting ready to start renovations, remodels, or space updates. It helps to guide making priority decisions on how to allocate and spend limited resources.
- I really like the personas and how the personas help me focus on how students want to use the library and its collections.
- If I were embarking on space design, there would be quite a bit here that I would find useful. I like that it is persona driven – it is helpful for figuring out what you need to consider for your campus population. The "do you have…" lists and questions are incredibly helpful, and I think very thorough, given my personal experience.
- This tool nicely breaks down space suggestions by hierarchy, and the suggestions are very thorough. Not all will apply to every situation, nor do they need to. For a larger project, such as a full renovation or new facility construction, this tool could serve as a discussion launch point with the planning team.

Multiple changes were recommended for the original tool draft and adopted into the final product. These changes aimed to provide more generic information, a better introduction, and a more user-friendly format. Recommended and adopted changes were:

- Modified wording on a few of the questions to make them less passive
- Adding table of contents/outline
- Improving the introduction and explanations of the hierarchy levels and personas
- Adding some framing questions that would be helpful before any remodel discussion
- Adding a link to building codes

- Adding a pricing legend key on each page
- Adding an image of the hierarchy on each page for quick reference
- Adding a couple key words about the personas on each hierarchy level
- Adding questions about needed adjacencies and location of space to each level
- Adding information about the need of faculty in focus groups and discussions, especially regarding to collection changes
- Adding information about the importance of campus communication and buy-in
- Adding a question to the Esteem Administrative section about handling space requests outside and separate from the library's mission
- Information about other existing tools that might be helpful
- Adding a references page

Suggestions about additional space recommendations were minimal. Only three specific spaces were mentioned (and added): security cameras and panic buttons, video and audio studios, and artificial intelligence labs and virtual/augmented reality spaces. Most felt the space recommendations were "thorough" and "comprehensive." Experts also felt the information did not have any major gaps, although there was one who would have preferred the information in a different format.

There were a few recommendations the author was unable to satisfy. These typically centered on providing more specific information regarding team setup, recognizing other partners or factors (campus facilities, Student Services, etc.) within each hierarchical level, and indicating the criticality of space suggestions. Due to the generic nature of this tool, the author

chose not to make changes in reference to these suggestions. Each campus will be different regarding staffing, policies, and student body. Some space suggestions deemed critical at one institution might be unnecessary at another. Committee establishment and funding models will also differ based upon institution type and structure. The author hoped to design a tool generic enough to be adaptable to all institutions but specific enough to be useful and felt that adding those specifics would need to be all or nothing—either provide all potential variations or none of them. The author chose to provide none.

Finally, the chosen categorization of the example personas is one interpretation but could potentially be categorized differently. The author strived to be as true to Maslow's original definitions in the Hierarchy of Needs as possible and matched personas based upon those original definitions. Spaces were then matched to the hierarchy based upon the persona the spaces best served. However, others could interpret things differently. One example is the Islander, with one expert recommending the Islander be classified as the only Self-Actualized persona since "the Islander transcends all personas". The author chose to focus on the Islander's need to find his/her place and interpreted that as a need for connection in the library. The need for connection directly correlates to the Hierarchy of Needs at the third level: Belongingness.

5 CONCLUSION/RECOMMENDATIONS

The purpose of this research was to create a useable tool for assisting library personnel, especially administrators, in making informed decisions regarding space allocation and allotment of renovation monies. Library administrators and librarians are not generally trained in facilities planning, and facility managers are not generally trained for the emotion and the politics centered around libraries, in general, and books, in particular.

5.1 Recommendations for Library Administrators

This tool was designed to provide specific space ideas, guiding questions, and a generic range of price expectations for each space recommendation in order to produce a data-supported framework for moving forward. Library administrators should:

- Focus on meeting the space needs in each hierarchical level from lowest to highest.
- Fill in the gaps of what is currently offered versus what is needed to meet lowest level needs before investing in significant improvements at higher levels.
- Remember that this tool is not designed to replace a feasibility study or the assistance of professional architects, consultants, engineers, or tradesmen. It is, instead, designed to meet immediate needs (a "start here", if you will) while also helping to provide some guidance for future proofing and strategic thinking.

5.2 Gaps in the Research

Several areas have been identified by the author as potential fields of further research.

5.2.1 Personas

The research uses personas developed at one institution and verified at a second institution of a similar size and in the same geographical region. While the verification suggests library-user personas could be universal, these personas should be tested and verified at multiple academic libraries of varying sizes and in different geographical regions. This would allow a claim of universality to be confirmed or denied.

Also, other academic libraries have created their own list of personas. An effort could be made to identify many of those other personas and determine if the personas are unique or simply named differently. This would also contribute to an argument of universal application.

5.2.2 Esteem

This particular study did not find any direct persona correlations with Maslow's Esteem level of the Hierarchy of Needs. Research could be done to identify if there is an undiscovered esteem-related library-user persona. Another possibility is an esteem persona is not related to student library users but instead to faculty library users or library personnel. Additional research is needed to verify or disprove any of these hypotheses.

5.2.3 Additional Tool Creation or Enhancements

During interviews, several suggestions were made about items that would be helpful in a self-analysis, space planning tool. These items include:

- An easily customizable form allowing for the accurate representation and recording of the number and the types of seating and technology found in any given space at any given time. This would also provide for reporting of number of seats versus number of used seats.
- A tool that can import a floorplan, both existing and potential.
- A way to determine if spaces are inclusive.
- An easy-to-use tool that allows for 2D scaled drawings with cut-and-paste functionality. Programs like Revit and AutoCAD allow for this, but they take training to use effectively, require licensing, and can have a steep learning curve for some people.
- An automated tool that would allow for input of the existing building and then:
    - The ability to search by type of space (makerspace, group study, collaboration, individual study, etc.)
    - The ability to input space coordinates and have the tool suggest possible uses based on important adjacencies, noise level, programming, etc.
    - The ability to input all existing physical parameters of the space (square footage, existing electrical, etc.) and have the tool provide estimates associated with renovating that space for identified potential usage (replace with collaborative space, replace with group study rooms, etc.).
    - The ability to input square footage devoted to book stacks and virtually see impact if stacks are increased or decreased by percentages.

These suggestions were more automated and technology based than the author currently intended. However, the creation or implementation of such tools could provide benefit to library administrators as they navigate creating a library sufficient for twenty-first century learners.

5.2.4 Adaptability

Research could be conducted to determine if this tool and/or its principles are adaptable to renovation of other types of facilities. Potential types of facilities include other types of libraries, non-library higher education facilities, and commercial buildings.

5.3 Conclusion

Securing monies for large, all-encompassing library remodels can be a difficult, years long process. The duration of the planning cycle can also heavily contribute to creating spaces that are immediately out-of-date and less useful for the originally intended purpose. This tool is designed to allow for a phased, organized, and evidence-based approach to remodels, using minimal funding to make maximum immediate impact. As additional conversations happen around the big, future picture of the library, the suggested space changes can allow for timely improvements to benefit current library users. It is important to remember that academic library users rotate through the sponsoring institution every four to six years, the general time it takes to create and to fund an all-encompassing remodel *if* the library is lucky enough to make it to the top of the list of institution priorities. How tragic it would be to delay any improvements for an entire generation of library users because the big picture was not yet determined or funded.

This research summarized previous research, compiled various existing tools and resources in one location, and outlined one method for library administrators to consider when

discussing potential library facility modifications. Extensive research exists around learning spaces and libraries for the twenty-first century student. However, there is little that provides an actual starting place, something to help an administrator or facility manager know where to begin. Thousands of pages of research and an even higher number of opinions cannot be sorted through quickly, leaving an academic library even farther behind as personnel attempt to discover the starting line. The author's intent was to create a data-backed, easy to use, quick reference tool to help guide administrators and facility managers through important conversations and space considerations, enabling informed improvements to happen faster and in smaller but meaningful chunks. Many of the library experts made positive comments about the usefulness of the hierarchical tool, but one comment stands out to the author. "I wish that I had had a concise tool like this when starting our big renovation to help me figure out what to consider, rather than figuring it out along the way. … I would definitely use this the next time I'm involved in a space planning project." That was precisely the purpose behind this research and effort: to create a guiding tool to help library administrators start from a place of knowing instead of having to figure it out as they go. With that and other similar comments, the author feels confident this project has created something of value to some and has been a success.

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APPENDIX A. "START HERE": A HIERARCHICAL GUIDE TO 21ST CENTURY LIBRARY LEARNING SPACE RENOVATIONS

Please see next page for hierarchical tool with formatting.

"Start Here"

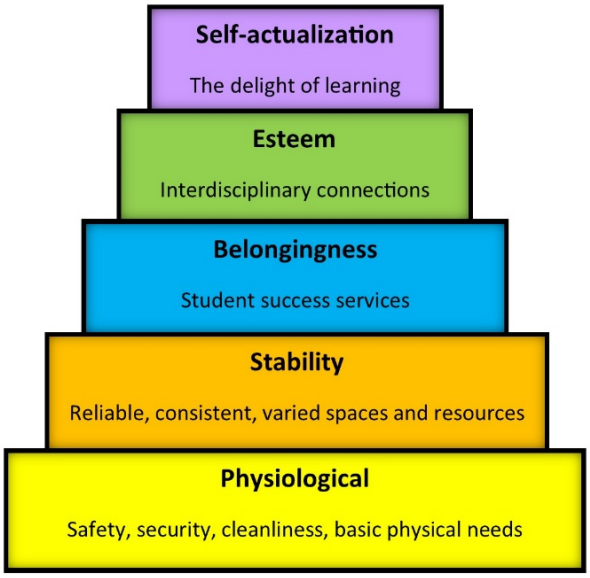
A Hierarchical Guide to 21st Century Library Learning Space Renovations

The purpose of this hierarchical tool is to build on the previous work of Cunningham and Tabur's "Hierarchy of Learning Space Attributes" (2012), and cross reference it with an example of library user personas (Zaugg, 2016) to create a useable tool for assisting library personnel in making informed decisions regarding space allocation and allotment of renovation monies. It is designed to provide specific space ideas, guiding questions, and a generic range of price expectations for each space recommendation. Space suggestions are made using information from literature reviews, in-person academic library tours, and interviews with professional library experts.

Library administrators should:

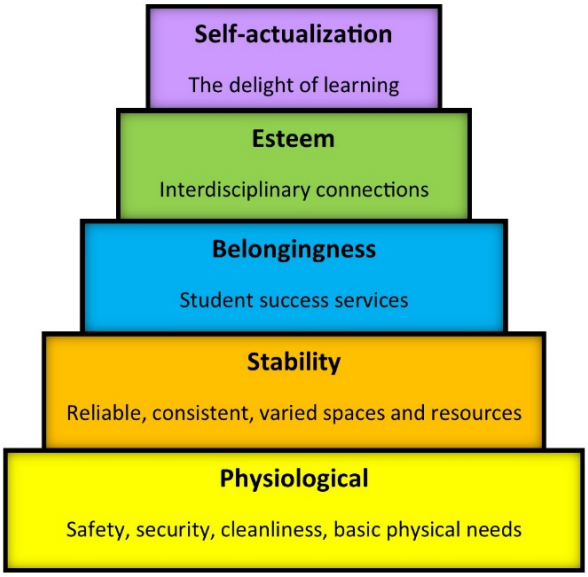
- Focus on meeting the space needs in each hierarchical level from lowest to highest.
- Fill in the gaps of what is currently offered versus what is needed to meet lowest level needs before investing in significant improvements at higher levels.
- Remember that this tool is not designed to replace a feasibility study or the assistance of professional architects, consultants, engineers, or tradesmen. It is, instead, designed to meet immediate needs (a "start here", if you will) while also helping to provide some guidance for future proofing and strategic thinking.

Included in this document are summarized definitions of the identified primary library user personas, color-coded for the associated space hierarchy level, and some general facility and construction related information which can be helpful to put a ballpark estimate on specific space improvement ideas.



Each hierarchy level has detailed, color-coded, hierarchy specific pages. These provide space suggestions associated with each level and include helpful questions to gather information about needs and to inform designs. Additionally, there is an "administrative" section within each level. This section is designed to provide information to administrators on strategic steps needed in order to prepare for space improvements associated with the next level on the hierarchy. This can help enable steady and informed forward progress. It should be noted that higher levels have fewer space suggestions. It is assumed that as administrators move through the levels, spaces will be created that become capable of meeting higher needs using existing spaces and minimal renovation monies.

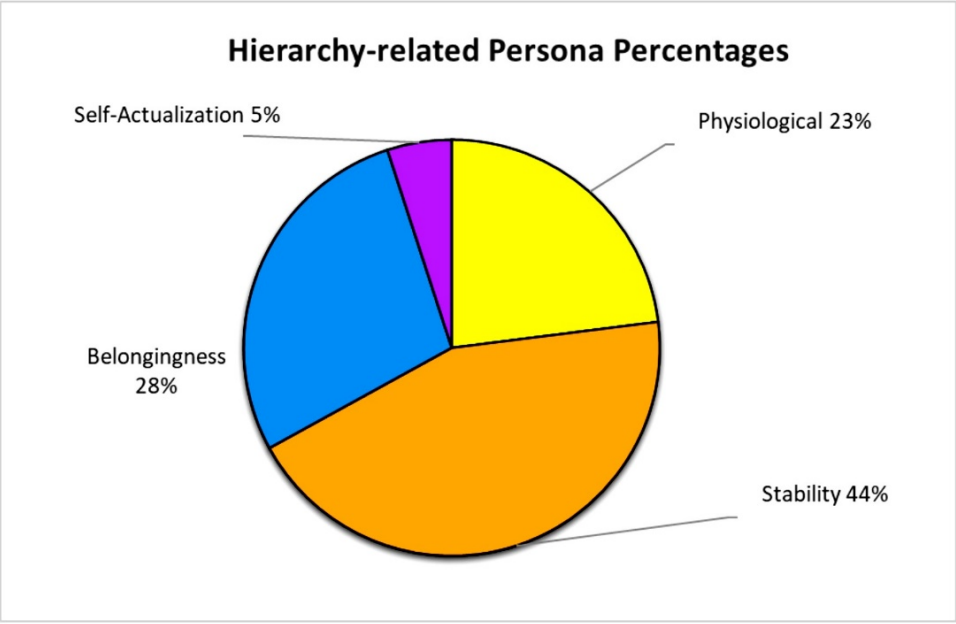
Outline



Persona Definitions

This analysis tool combines the work of others (specifically Maslow, Cunningham, Tabur, Kent, Zaugg, and Ziegenfuss) in a novel way, layering an example of library user personas over a space hierarchy to provide a systematic method for creating library learning spaces that meet the needs of 21st century library users. The personas have been color-coded to identify which hierarchy level most closely aligns with the space needs of each persona, and percentages represent the percentage of library users who identified that persona as their *primary* persona. While library user personas are fluid dependent upon user needs and may differ based upon institution, identified primary library user personas (see Zaugg, 2016; Zaugg, Ziegenfuss, 2018) are:

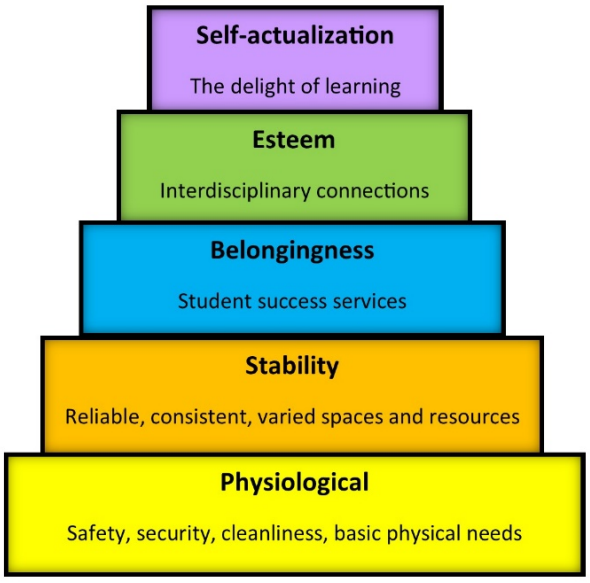
- ***Pirate*** *(18%)*: patrons who view the library as a place of convenience with access to resources so that the patron is not required to provide those same resources. Pirates are typically associated with technology (software, computers, etc.).
- ***In-n-Outer*** *(5%)*: patrons who view the library as a place to access services but do not want to spend any more time in the library than is necessary.
- ***Focuser*** *(18%)*: highly motivated patrons who prefer to study in the library, alone and in quiet, with little distraction or possibility of interruption.
- ***Outsider*** *(5%)*: patrons who use digital library resources without ever wanting or needing to come into the physical space.
- ***Collaborator*** (10%): patrons who work together, whether by requirement or by choice, on projects and/or class assignments.
- ***Sidekick*** *(11%)*: patrons who draw energy and motivation from being in a group. They are social enough to want others nearby but focused enough to work on their assignments while surrounded by others.
- ***Islander*** *(26%)*: patrons who have found and regularly use specific locations in the library. They are similar to other personas (like sidekick or focuser) but are differentiated due to their emphasis on location.
- ***Socializer*** *(1%)*: patrons who see the library primarily as a social gathering place to meet old and new friends and not as an academic tool.
- ***Chillaxer*** *(1%)*: patrons who blend work and pleasure in their use of the library with a strong balance between work (assignments, studying) and pleasure (naps, streaming movies, social media).
- ***Explorer*** (5%): patrons who visit the library searching for new knowledge and learning opportunities which may or may not be curriculum related.

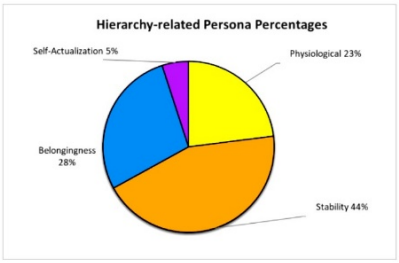


Hierarchy Definitions

Abraham Maslow (1908-1970), a 20th century psychologist, postulated that humans meet their needs based on a five level hierarchy. When cross-referencing Maslow's categories with an example of library –user personas and multiple space suggestions, the space hierarchical categories are defined as follows:

- **Physiological**: This level is for the basic necessities of users—things like food, safety, clean restrooms, and shelter. These are the resources and spaces any user can and will likely use and are designed to meet immediate physical and academic needs of the user. Included in this level are wifi improvements, additional power outlets, comfortable interior temperatures, easily accessible computers and printers, generous food policies, and abundant advertisement and instruction for the digital resources provided by the library.
- **Stability**: This level is about order and stability. The focus is on providing an array of spaces and resources (physical and digital) to reliably and consistently meet the academic needs and the learning styles of a variety of users. Included in this level are spaces for collaborative study, solo study, studying alone while with others, deep quiet study spaces, and basic curriculum-driven technologies. This level also focuses on enhancing usability and access of digital resources.
- **Belongingness**: This level is designed to address the belongingness needs of users. The intent is for users to personally connect with someone or with something in the library, and the target is on providing spaces that allow for assistance, for comfort, and for connection. Included in this level are spaces for tutoring, socializing, collaborating, consulting, and teaching. There is also an emphasis on providing furniture that meets a variety of physical comfort needs and on flexible spaces designed to be rearranged to meet the current needs of individual users.
- **Esteem**: This level is to recognize and highlight achievement. Space decisions begin to focus on faculty, student, and library personnel achievements and expertise. Included in this level are exhibit spaces curated by students, spaces designed to teach from primary resources, faculty-focused spaces, and areas designed to allow for serendipitous connections between faculty members and/or between faculty and students.
- **Self-Actualization**: This level emphasizes the fulfillment of personal potential. The purpose is not necessarily to create specific, curriculum-driven spaces, resources, or technology, but the spotlight is instead on the delight of learning. These are spaces that provide for exploration and discovery, and are designed to allow a user to find joy and excitement in things other than his or her class assignments. Included in this level are cutting-edge technologies, public outreach events, and spaces for film screenings, faculty lectures, gaming, student conferences, and galleries.





Tips

Construction Information

Structural:

- The current code requires 150 pounds per square foot live load for standard shelving. Compact shelving requires double that amount depending on type of shelving, spacing and direction of rails, and types of items being stored on the shelving.
- Building codes for gravity loading of library stacks has remained fairly consistent over the last several decades. The ability of an older building to support gravity loading for standard stacks should remain unchanged assuming the building was well-designed, constructed of quality materials, and has been reasonably maintained. However, water infiltration can affect building structure. Therefore, if past water damage is likely in your building, you will want to request and to conduct a structural assessment to assure structural soundness.
- If a building is older than the late 1970's, seismic deficiencies are highly probable due to significant changes to code requirements.

Electrical:

- Most commercial builds should have adequate electrical service to the building for electrical additions. National Electrical Code rules for sizing services, etc., have purposefully been oversized for at least the last 50 years, and education facilities have been designed to distribute 15 watts per square foot when usage is generally around 5 watts per square foot (see Anthony et al, 2013).

Building Codes:

A good reference for state building codes can be found at https://codes.iccsafe.org/ . The IBC (International Building Code) and IEBC (International Existing Building Code) will likely be most applicable, but this website provides links to all codes and can be searched by state.

Estimating Helps

Construction:

While construction prices are impacted by region, age of the facility, existing conditions, finish choices, intensity of the remodel (a spruce up, a complete gut, reusing existing furniture and walls, etc.), and other factors, a ballpark estimate can be determined as follows:

- Open spaces can generally be remodeled, including furnishings, for about **$150 per square foot**.
- Broken up spaces (offices, classrooms, spaces with more wall construction) can be remodeled, including furnishings, for about **$200 per square foot.**

Electrical:

Electrical prices can be estimated as follows:

- Additional outlets when a new circuit or new panel is NOT needed:
  - ⇒ Conduit and wire = $300 per outlet
  - ⇒ Metal clad cabling = $150 per outlet
- New circuit needed but there is room in the existing panel:
  - ⇒ $500 per circuit within 100 feet of an existing electrical panel
  - ⇒ Add $200 per 100 feet beyond the first 100 feet from existing panel
- New panel and new circuits needed:
  - ⇒ $1,000—$2,000 for engineering consultation
  - ⇒ $5,000 for new panel
  - ⇒ $1,500 per circuit

Circuit information:

- One circuit can typically run either 3 rooms of lights, 2 rooms of outlets, or 1 dedicated piece of equipment.
- Seven to 15 outlets can be run off of one 20 amp circuit.
- For a 1,000 square foot room, 3 circuits on average will be needed.

Tips

Estimating Helps

Electrical (continued):

A dedicated circuit is needed for:

- Any industrial equipment (laser cutters, CNC machines, presses, etc.)
- Kitchen equipment (refrigerators, microwaves, etc.)
- Air heating or cooling equipment (heaters, mini-split systems, air conditioning window units, etc.)
- Dedicated technology outlets (servers)
- Vending machines

Wifi:

Adding wireless arrays to an existing facility and system will cost about **$950 per array**, including labor and additional Ethernet if needed. This will also depend on your campus strategy and vendors. That number is based on the price to increase wireless capacity in about 75% of a 700,000+ square foot academic library with an existing wireless system and a campus-wide technology team. It would likely be less expensive for a smaller building (shorter cable runs, etc.). This also accounts for each user in the covered area connecting to the wireless array with up to 3 devices simultaneously.

Important contacts:

If your institution has a campus facilities department, reach out to them to discuss actual pricing for your region/area. There will also likely be specific contracts or policies in place regarding vendor, funding, etc. If the University Librarian and/or facility manager is unaware of whom to contact or of policy details (example: some institutions have policies about mandatory campus or board approval for renovations over a certain amount of money), begin asking questions up the reporting chain until the correct connections are made and information gathered.

Practical Questions

Practical questions to answer before beginning any remodel:

- What is the issue you are trying to solve? Can the issue be solved without a remodel?
- How much money is available for a remodel/improvement?
- What is the available/expected time frame for the remodel?
- Will campus level approvals be needed for improvements?
- Will you need to fundraise?

Post Occupancy Evaluations

Remember:

Post occupancy evaluations should be conducted after any remodel/improvement, and information should be collected at different times of day and during different times of the semester to be truly representative.

Questions:

- How successfully are students using the space?
- How does the student feel when he/she/they are using the space?
- Would the student return to use the space again? Why or why not?
- How many times per day/week/semester do/would the student use the space?
- Are students using the space as it was designed to be used?
- Are students using the space differently than the design intended?
- What furniture is being used and how frequently?
- What furniture is not being used?
- How often are the library-owned/provided technologies being used in the space?
- What is surprising to you about how students are using the space?

Physiological

Keys: Safety, security, cleanliness, basic needs
Specific personas : Pirate , In-n-Outer (convenient resources)

Space

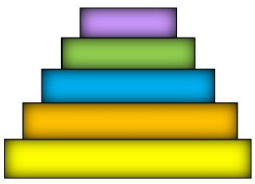
Do you have:

$0—$5,000 = $
$5,001—$10,000 = $$
$10,001—$50,000 = $$$
$50,001—$100,000 = $$$$
More than $100,000 = $$$$$

$	A generous food policy
$	Vending machines (each)
$	Water bottle fillers (each)
$	Improved wifi (per array)
$	More power outlets (every 4 to 8 feet or near every seat)
$	Baby changing stations in all restrooms
$	Clean/durable/upgraded restroom facilities
$	Drug and safety trainings
$	Security cameras/panic buttons (each)
$-$$	Easily accessible public computers and printers
$-$$	Proper and prolific advertisement of electronic resources and how to access them
$$	Quality janitorial staff and equipment
$ - $$$	Lactation rooms (depends on if sprucing up existing space or creating new)
$-$$$$$	Ability to remove barriers to open safety site lines
$-$$$$$	ADA accessibility improvement needs
$-$$$$$	Adequate life-safety features (sprinkler systems, emergency evacuation chairs, etc.)
$$$-$$$$	Gender neutral/family friendly restrooms (depends on location and finishes)
$$$-$$$$$	Family-friendly study rooms (depends on size and amenities offered in space)
$$$$	A café/coffee shop
$$$$$	HVAC improvements

Questions:

- Is your space safe? Do you have any dark corners or hidden spots that create danger?
- Can site lines be improved for safety?
- Where can or should security cameras/panic buttons be added to improve the safety of staff and/or library users?
- Is your building clean?
- Are your bathrooms in good repair (and clean)?
- Do you provide some access to food/drink? What is the food policy and should it be revised?
- Are the physical needs (food, drink, safety, biological needs, etc.) of a student adequately met to allow for a long stay in the library?
- Do you have places you can or should add electrical outlets (every four to eight feet or available at every seat)?
- Does your wifi need to be boosted?
- How is the light in your building? Can you add more windows? Can you improve the lighting fixtures?
- Is there natural light easily available to students/library users?
- Is the space temperature correct?
- Do you offer spaces friendly to student-parents? Is this a need of your campus community?
- What ADA improvements are needed to allow access to your building, your collections, and your services? Even if you are compliant, can you be better-than-compliant?
- Is the space easy and convenient to access?



Physiological

Keys: Safety, security, cleanliness, basic needs
Specific personas : Pirate , In-n-Outer (convenient resources)

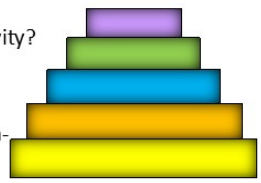
Administrative

Things to do:

$	Gather data about current space usage including: technology usage and requests; furniture, areas, or items that are not being used as originally intended; when and where electrical cords are placed across walkways or furniture is relocated; consistently well-used or underutilized spaces or furniture
$	Identify mechanical locations—these tend to be non-negotiables due to extreme expense associated with relocating them
$	Start learning about Post Occupancy Evaluations, what they are, and how to conduct them
$	Begin focus groups and individual interviews with student users to discuss needs and wants for library spaces, services, and resources
$-$$	Complete a current HVAC load analysis
$-$$	Complete a structural analysis of the building to determine potential future locations of stacks and compact shelving

Questions to answer:

- What is the mission/vision of your library? How do the spaces, resources, and personnel decisions connect to that vision?
- How does the library fit into the campus ecology? This includes knowledge about the pedagogy, learning philosophies, and style of the institution. How should the library, its services, and its collections serve the institution? How does the library contribute to the vision of the institution?
- How is the library presently perceived by faculty, administration, and students?
- Have you included faculty and campus partners in focus groups and discussions, especially in regards to collection changes?
- Have you determined a campus communication strategy regarding library changes to ensure buy-in from faculty and campus administration? You may wish to consider creating strategic faculty "ambassadors"—faculty library users who are willing to return to their departments and share information/explain the library's vision to naysayers.
- How does the design of the library match the university's claim of authority over knowledge? If the university is fully ensconced in "teachers teach and students learn"/"sage on the stage", then the designs should embrace that. If the university is pushing to a different model—active learning/blended learning/"guide on the side"—the designs should embrace that.
- Are there any special accreditation requirements for libraries from your regional accreditor?
- What are the non-negotiables? (Example: the same number of books must remain in the space, all librarians must have offices, etc.)
- Does your library provide an equitable success outcome for all intended users? Why or why not? Can any identified inequities be resolved using space?
- What technology capabilities can your staff support?
- How much funding is available for the renovation and/or the technology?
- What is the service strategy moving forward? Does it include one or many service desks? … 24/7 service or something else? … Offices for all staff/administration or just some? Etc.
- Is the space plan informed by the service/programming design rather than vice versa?
- What critical space and service adjacencies exist in your facility? Where can those be improved? (Example: Should librarians be collocated with the collections they manage?)
- Do all on-site services, staff, and assets need to remain onsite to enhance learning and productivity? How much of the traditional library program must remain in a centralized facility?
- Does the collection size match the specific needs of the institution based upon the curriculum?
- Are your staff adequately trained for emergency situations (violence, drug use, medical emergencies, natural disasters)?



Stability

Keys: Variety of space and resource options designed to consistently meet the needs of multiple learning styles
Specific personas : Focuser, Outsider, Collaborator, Sidekick (varied space needs)

Space

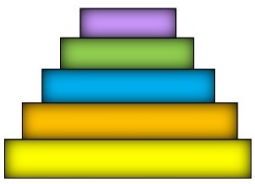
Do you have:

$0—$5,000 = $
$5,001—$10,000 = $$
$10,001—$50,000 = $$$
$50,001—$100,000 = $$$$
More than $100,000 = $$$$$

$	Individual study spaces
$	Study carrels
$	Book-surrounded study spaces
$	Deep quiet study spaces
$ - $$	Nooks with seats, power, and wifi access
$ - $$	Basic, curriculum driven technology (calculators, cameras, specialty software, TVs)
$ - $$	Meditation/prayer rooms
$ - $$$	Collaboration spaces with and without technology
$ - $$$	Flexible spaces
$ - $$$$	Spaces designed for multiple uses
$ - $$$$$	"Traditional" library spaces (great halls, large tables, book display shelves, etc.)
$ - $$$$$	Fire places, murals, well-preserved or restored areas that share the uniqueness and history of your facility
$ - $$$$$	Improved content access, both digital and physical
$ - $$$$$	Easily accessible physical, digital, and human resources

Questions:

- Are you adding more electrical outlets when and where possible?
- Are you continuing to improve wifi access?
- Does this change reduce the friction/distance/inconvenience between students and the information they need?
- Are the interfaces in the space simple and intuitive?
- Is the space easy to maintain? Is that important to your organization?
- Does the "stuff" need to be attached to the structure?
- Does the technology meet the immediate needs of students?
- How often will the technology need replaced?
- Does the space encourage the user to remain on task? Is it intended to encourage that?
- Is there quiet space, designed to accommodate deep dives and long study sessions?
- How might this space be designed to encourage students to spend more time studying and studying more productively?
- Who are the primary users of the space?
- Is the learning that currently happens in this space independent of time and place? If so, does it need a brick and mortar location? (example: mobile apps, digital collections/access, etc.)
- How many students are using the space currently? How many students is the space being designed to accommodate? How many students do you want to use the space at one time?
- For what position in the spectrum from isolated study to collaborative study should this space be designed?
- What types of activities do you want/not want happening in this space?
- What does the space design communicate to the user? What behaviors and outcomes are wanted from student use of the space?
- Is the amount of space right for the intended programming?
- Is the noise level right for the intended programming?
- Is the crowdedness right for the intended programming?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?



Stability

Keys: Variety of space options designed to meet multiple learning styles
Specific personas : Focuser, Outsider, Collaborator, Sidekick (varied space needs)

Space

Questions (continued):

- Are there traditional library spaces offered?
- Have you incorporated special things about the space that share the history and the legacy of the building and the institution?
- Does the space allow for diverse talents and ways of learning?
- Can the space be used for multiple purposes?
- Are multiple types of space offered within the library walls?
- Is there enough space for group work?
- Are students free to move through the space? … to rearrange the space? … to socialize in the space?
- Are there barriers between students and staff? Are those barriers intentional? If not, can the barriers be removed?
- Does space design encourage students to seek out assistance when needed?
- Does space design make it difficult for students to find and/or approach library staff?
- Do post-occupancy studies support the changes or are other changes necessary? What are the observations showing about space usage?

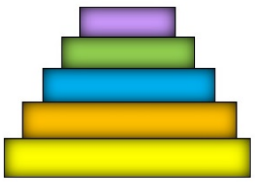
Administrative

Things to do:

$	Solidify post occupancy evaluation strategy
$	Perform a detailed analysis of focus group and individual interview responses, creating an informative and guiding tool about users needs/wants
$	Conduct post occupancy evaluations of any space change
$-$$	Determine a wayfinding/signage strategy

Questions to answer:

- Are you honoring the mission/vision of the library with the things you are changing/leaving the same?
- Are you continuing to keep in mind and providing for the physiological needs of the users? Are you including those things in any remodels/improvements?
- Are you emphasizing forward-thinking and future-proofing strategies during space-related discussions?
- Do you want to encourage napping in the library? (Napping has space and furniture implications.)
- What is your comprehensive wayfinding/signage strategy?
- Do you want to use color schemes, carpeting, etc., as part of your wayfinding strategy?
- Are you conducting post occupancy evaluations with every change?



Belongingness

Keys: Student Success Services
Specific personas : Islander, Socializer, Chillaxer (connecting with someone or something in the library)

Space

Do you have:

$	Tutoring spaces
$	Social gathering spaces
$	In-depth consultation spaces
$	Moveable whiteboards
$ - $$	Presentation practice space
$ - $$$$	Flexible/moveable furniture
$ - $$$$	Variety of furniture options (not wood chairs)
$$	Training (staff and student) for enhanced technologies
$$ - $$$$$	Enhanced, curriculum-driven technologies
$$ - $$$$$	Makerspaces
$$$	Graduate student spaces
$$$-$$$$$	Video and audio studios
$$$ - $$$$$	Library instruction space
$$$$	Writing Centers
$$$$	Math Labs

$0—$5,000 = $
$5,001—$10,000 = $$
$10,001—$50,000 = $$$
$50,001—$100,000 = $$$$
More than $100,000 = $$$$$

Questions:

- Are there different furniture types, sizes, and aesthetic colors provided?
- Are there a variety of spaces and furniture to meet personal and varied student needs?
- Is the furniture flexible? Can it be moved or rearranged? Is the flexible nature of the furniture obvious to the user?
- Is the comfort of furnishings right for the programming?
- Does the space encourage contact between student and staff?
- Does the space help develop reciprocity and cooperation between students?
- Should this space be designed to encourage student/teacher exchanges outside of the classroom?
- Are there spaces for faculty and students to experience planned and serendipitous encounters?
- What type of collaboration is happening in the space? Student to student? Student to staff? Staff to staff? Faculty to faculty? Partner to partner? Is that the intended collaboration? Does the space design adequately meet those needs?
- What learning and teaching scenarios will happen in the space?
- Can the space be easily and quickly reconfigured to meet the needs of the identified learning and teaching scenarios?
- Is the learning that happens in the space dependent of place and dependent of time? Is the right place for this space in the library? (examples: classrooms, makerspaces)
- How often will the technology need to be updated?
- Do existing staff have the necessary skills to assist patrons with their needs (technology, research, production, etc.)?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?

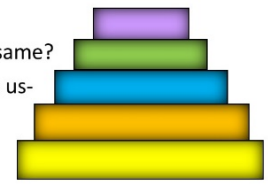
Administrative

Things to do:

$	Conduct post occupancy evaluations of any space change

Questions to answer:

- Are you honoring the mission/vision of the library with the things you are changing/leaving the same?
- Are you continuing to keep in mind and providing for the physiological and stability needs of the users? Are you including those things in any remodels/improvements?
- Are you conducting post occupancy evaluations with every change?



Esteem

Keys: Interdisciplinary Connections
Specific personas: None (recognize and highlight achievement)

Space

Do you have:

$	Classrooms for librarians to teach their expertise
$	Spaces that encourage interdisciplinary interactions
$	Exhibits curated by students and faculty
$	Poster sessions by students
$	Displays of student work
$ - $$$	Mixed staff and student space to create more natural interactions
$ - $$$$	Faculty-focused spaces
$$ - $$$$	Spaces to teach from primary resources

$0—$5,000 = $
$5,001—$10,000 = $$
$10,001—$50,000 = $$$
$50,001—$100,000 = $$$$
More than $100,000 = $$$$$

Questions:

- Does the space design allow students the ability to easily show or tell library staff about student's thoughts and opinions?
- Does library space allow for tactile learning, visual learning, regurgitation, primary research, etc.?
- How might this space enrich educational experiences?
- How does the library add value to the academic experience of the student and the faculty?
- Is there a space for faculty to mix with peers of other disciplines? Is the library the right space for that?
- Is the learning that happens in this space dependent of place but independent of time? Is the right place for that in the library? (examples: AR/VR, interactive exhibits, etc.)
- Is the learning that happens in this space independent of place but dependent of time? Is the right place for that in the library? (examples: webinar/distance learning spaces)
- Does the space use active learning techniques? Is it appropriate for the institution? Is the right place for that in the library?
- What is it about the learning/research that will happen in this space that compels you to build a brick and mortar learning space rather than rely on a virtual one?
- How can the library function as an interdependent facility with other learning and teaching opportunities on campus in the future?
- Is the space location determined by convenience (i.e. "This is where space is available.") or by strategy (i.e. "This is where the space belongs.")? Is that intentional? What is the impact?

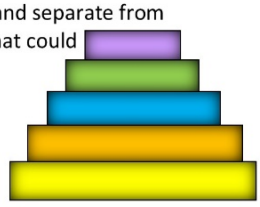
Administrative

Things to do:

$	Conduct post occupancy evaluations of any space change

Questions to answer:

- Are you honoring the mission/vision of the library with the things you are changing/leaving the same?
- Are you continuing to keep in mind and providing for the physiological, stability, and belongingness needs of the users? Are you including those things in any remodels/improvements?
- Are you conducting post occupancy evaluations with every change?
- What is your plan for evaluating and deciding on space requests from campus entities outside and separate from the mission and vision of the library? Is there information within the hierarchy and personas that could provide evidence for or against those partnerships?



Self-actualization

Keys: The delight of learning
Specific personas : Explorer (fulfillment of personal potential)

Space

Do you have:

$0—$5,000 = $
$5,001—$10,000 = $$
$10,001—$50,000 = $$$
$50,001—$100,000 = $$$$
More than $100,000 = $$$$$

$	Public outreach (beyond the university)
$ - $$	Art
$ - $$	Gaming locations
$ - $$$	Color
$ - $$$	Galleries
$ - $$$$$	Cutting-edge, exploratory technologies (not necessarily curriculum-driven)
$ - $$$$$	Artificial intelligence labs
$ - $$$$$	Virtual and augmented reality spaces
$ - $$$$$	Aesthetics/creating spaces that inspire
$$ - $$$$$	Workshop/conference space
$$$$	Auditoriums
$$$$	Group film-screening locations

Questions:

- Do all services, staff, space, and assets enhance learning and productivity?
- Does the technology encourage discovery and exploration?
- Does the space communicate high expectations for scholarship and achievement?
- Are the students surrounded by the academic triumphs of others?
- Are the university and its members (past and present) showcased?
- Are quality works exhibited and made available for student viewing and access?
- Is the space environmentally friendly?
- Is the space location determined by convenience (i.e. “This is where space is available.”) or by strategy (i.e. “This is where the space belongs.”)? Is that intentional? What is the impact?

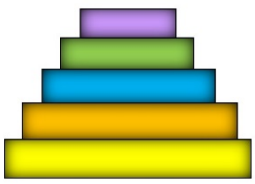
Administrative

Things to do:

$	Conduct post occupancy evaluations of any space change
$$ - $$$	Analyze space implications for additional strategic partnerships

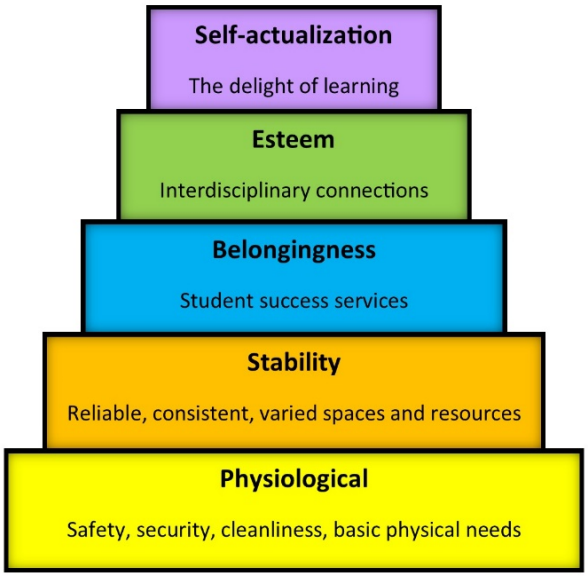
Questions to answer:

- Are you honoring the mission/vision of the library with the things you are changing/leaving the same?
- Are you continuing to keep in mind and providing for the physiological, stability, belongingness, and esteem needs of the users? Are you including those things in any remodels/improvements?
- Are you conducting post occupancy evaluations with every change?
- What programs not in the library at present should be in the facility in the future? What partnerships should be nurtured?



Other Potentially Helpful Tools

- **The Flexible Learning Environments Exchange** (https://flexspace.org/) –an ever-growing database of member-submitted case studies. It allows users to "document and showcase learning spaces, share resources and best practices, work collaboratively with campus colleagues and partners, and connect with an ever-expanding worldwide community." It allows access to existing research and space renovation projects at various institutions.
- **The Learning Space Toolkit** (http://learningspacetoolkit.org) --designed with helpful resources for six stages of planning and implementing new learning spaces.
- **The Society for College and University Planning** (https://www.scup.org/) –designed for those involved in most aspects of higher education facility planning with easy access to various articles and resources.
- **Learning Space Rating System** (https://www.educause.edu/eli/initiatives/learning-space-rating-system) – "provides a set of measurable criteria to assess how well the design of classrooms support and enable active learning" and also provides access to resources related to information technology innovation.
- **Service Model Canvas** (http://www.uxforthemasses.com/updated-service-model-canvas/) – designed as a tool to specifically develop and document service models.
- **Academic Library Building Design: Resources for Planning** (https://acrl.libguides.com/buildingresources) – sponsored by ACRL (the Association of College and Research Libraries) and LLAMA (the Library Leadership and Management Association), this website provides information on various scholarly articles and resources that, if a researcher knows it exists, can be extremely helpful for research-based planning
- **Learning Spaces Collaboratory** (https://www.pkallsc.org/) – this website provides access to materials related to learning space development for the creation of physical learning environments designed to engage learners. It provides scholarly articles, access to notes from conferences, and case studies. LSC is sponsored by institutions like Flexspace (highlighted above), SCUP (highlighted above), and Educause (highlighted above).
- **Whole Building Design Guide: Academic Library** (https://www.wbdg.org/building-types/libraries/academic-library) – focuses on information for new-build academic libraries. However, many design suggestions could be modified for existing library facilities.
- **Project Outcome by ACRL** (https://acrl.projectoutcome.org/) – provides resources and tools to create surveys and analyze outcome data for collections, instruction, research, teaching support, events/programming, library technology, and space.
- **The Journal of Learning Spaces** (http://libjournal.uncg.edu/jls)-- a peer-reviewed, open-access journal dedicated to publishing articles "related to all aspects of learning space design, operation, pedagogy, and assessment in higher education."



References

This tool was created as part of a masters thesis titled "Creating Library Learning Spaces that Support 21st Century Pedagogy and Student Learning" by Deborah L. Christoffersen, Brigham Young University. For the full literature review and methodology, please see the original thesis document found on BYU's Scholars Archive (https://scholarsarchive.byu.edu/) after June 2020.

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