AC 2012-3899: TAPPING THE USER EXPERIENCE TO DESIGN A BETTER LIBRARY FOR ENGINEERING AND TEXTILES STUDENTS AND FACULTY

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I. Introduction

In recent years many academic libraries have embraced methodologies for learning more about the totality of users' experiences, including attitudes, motivations, and emotions in order to inform decisions. A growing number of libraries are undertaking projects to study users' behaviors by leveraging ethnographic methods such as those described in the University of Rochester's studies of researchers and students.[1, 2] Librarians are also leveraging research tools and design processes from the user experience (UX) profession, most frequently for web design projects, but also for space and service design. Such research efforts make sense in libraries where focus on the user has always been of high importance, but ever evolving use of technologies and changes in learning-style preferences have called for continual commitment to collecting feedback in an organized and reportable manner. This paper describes how researching the user experience has been an important part of our process of designing a new 128,000 square-foot library scheduled to open in 2013. Through a range of data-gathering methods our library has developed a richer understanding of our users' behaviors, preferences, and needs related to spaces, services, and technologies. Additionally, librarians have used personas, popular in web interface and product design, to package much of our data into a form that can be used for planning spaces and services within the new library. Such efforts to study our users have enabled us to keep students and researchers at the heart of designing new spaces and services. It should be noted that this paper does not discuss the findings of the data collected in detail, but focuses on our processes of gathering user-research data and effective methods for user studies that are applicable in other libraries.

II. Designing for the user

Providing excellent spaces, services, technologies, and websites are now fundamental to the mission of the academic library. At the heart of these efforts is the need to design with the user in mind, which begins with knowing your users' behaviors and aspirations. As a result, librarians are increasingly adopting methods for learning about and understanding our users. A growing number of libraries are undertaking projects to study users' behaviors by leveraging qualitative methodologies, ethnographic strategies, and participatory design processes such as those described in the University of Rochester Libraries' studies of researchers and students. Their work to understand faculty's research practices and behaviors [1] and "what students really do when they write their research papers" [2] have inspired many other libraries to employ an anthropological approach to learning more about library users. Some of these projects are noteworthy for their size. The two-year ERIAL Project, a partnership of five universities in Illinois, resulted in guides to ethnographic methodologies for librarians and a book on student culture and academic libraries. [3, 4] Other projects are smaller in scope, focusing on a specific user group at a particular library. Some libraries are hiring anthropologists or collaborating with anthropology professors and students to implement projects. Others have created user experience librarian positions, dedicating staff to this important area.

At the heart of this research is a movement toward participatory design practices, whereby those stakeholders driving design decisions involve end users in the design process. Such intentions are also at the heart of librarians' growing use of tools from the user experience (UX) design community, which has its strongest roots in web and product design. Over the last decade UX professionals have developed a variety of tools and processes intended to move from designing products to designing user experiences. Among the increasingly common UX tools are personas, fictitious characters embodying core traits of specific end user groups. Personas are beginning to appear in the library literature pertaining to web design projects,[5, 6] but as far as the authors can tell, they are just now being written about as tools for library space and service design.[7] Personas are becoming more commonplace in the burgeoning service-design community and architecture / space design outside the library sphere.[8] As libraries give greater attention to the design of services, personas likely will become more commonplace in library projects as well.[7]

III. Institutional context

In 2010, the NCSU Libraries began construction of a new library building to serve the Colleges of Engineering and Textiles at North Carolina State University (NCSU). Slated to open in January 2013, the James Hunt, Jr. Library is meant to redefine the library of the 21st century in terms of services, technology, and learning spaces. The Hunt Library is located on the Centennial Campus, a 1,000-acre technology community located adjacent to the University's main campus. Centennial Campus is home to university departments and centers, as well as corporate, government, and industrial partners. The campus has been under development since 1987, but has seen the most significant growth in the last decade. The College of Textiles was the first college to be located on Centennial, moving into a four-building complex in 1991. This College is made up of two departments, with 50 faculty and approximately 1,000 undergraduates and 100 graduate students. The College of Engineering, with nine departments, 333 faculty, 5,900 undergraduate students and 2,800 graduate students, has been moving over in stages since 2004. At present, three of five planned engineering buildings are open, with six of the nine departments permanently located on the new campus.

In terms of library services, the Textiles Library, a branch library located in the College of Textiles, has been the only library service point on Centennial Campus. This library has served the faculty and students of the College of Textiles for more than 60 years. In many ways it is a typical branch library, with a small staff and a service model designed for the local community. Over the last decade, as the campus has grown, it has come to serve as the library for all of Centennial Campus, providing outreach and services to the academic and corporate/government entities on campus. With each passing year the need for a large, central library with spaces, facilities, and staffing to support thousands of students and faculty has become greater. The long-awaited opening of the Hunt Library will provide an intellectual heart to the Centennial Campus with spaces and services that will scale to this diverse and growing community.

In 2007, a major renovation in the central library on main campus, the D. H. Hill Library, resulted in a 14,500-square-foot Learning Commons. The result is that the D. H. Hill Library has become a dynamic center of student academic and social life. The space contains a mix of fixed and movable furniture and 103 desktops, complemented by a popular technology-lending program through which students check out laptops, iPads, Amazon Kindles, graphing calculators

and more. The open plan of the Learning Commons is complemented by a suite of 16 group study rooms, which can be reserved up to a week in advance, and a Digital Media Lab outfitted with a wide variety of scanners and workstations with audio and video production software. The Learning Commons has been exceptionally successful since its opening, primarily with undergraduates seeking spaces where they can work together or near their peers. It has been clear, however, that the dynamic, highly collaborative environment of the Learning Commons does not meet the needs of all learners, especially graduate students. As a result, as new monies have become available, the Libraries have continued to renovate additional spaces in D. H. Hill, resulting in a Silent Reading Room, a comfortable "Living Room" area with soft seating, additional group study rooms, and an experimental "Technology Sandbox" space with Microsoft Surface tables, a Perceptive Pixel display, and a SMART Board, among other things. In many ways, these diverse spaces have served as an incubator for the Hunt Library, which will contain a wide range of learning spaces.

Observation and interviews with students about the various spaces in D. H. Hill Library have provided an ideal window into the space and technological needs of undergraduates. As the Hunt Library planning process began, it became clear that library staff lacked knowledge about the campus' many graduate students whose needs for informal learning spaces might vary greatly from undergrads. Additionally, there has been a strong political need for the Libraries to gather feedback from faculty in order to gain support for the Hunt Library throughout campus. The opening of the Hunt Library will result in the closing of the Textiles Library, the collections and staff of which will move to the new facility. It will include an automatic retrieval system, our "bookBot," which means that approximately 760,000 volumes of the collection will be taken physically from the book stacks in the Textiles Library and D. H. Hill Library. As a result, much of the user research described below was undertaken with the dual purposes of (1) learning more about our graduate students' and faculty's needs related to our spaces, services, and collections and (2) engaging our user communities in important conversations about plans for the Hunt Library, its opportunities, and challenges.

IV. User-research methods

Since 2009 staff have been gathering user-research data in order to improve existing library services and spaces, as well as plan for the Hunt Library. Small teams of library staff have participated in a variety of research projects designed to learn more about users. They have used focus groups, interviews, photo interviews (photo diaries), formal observations, and surveys to engage with graduate students, undergraduates, and faculty. In 2010, the Libraries, in partnership with another campus entity and two strategic-design consultancy firms, were awarded an IMLS National Leadership Grant to study informal learning spaces and create a Learning Space Toolkit. This website will help stakeholders in higher education plan new spaces or renovate existing ones. The instruments from several of the NCSU Libraries' user-research projects, including a number of those described below, are provided as tools within the Toolkit (http://learningspacetoolkit.org).

A. Learning about our graduate students and faculty

Since 2009 library staff have been connecting with graduate students and faculty to learn about their behaviors and needs. Initially, a small research team conducted two focus groups with Engineering and Textiles graduate students and three focus groups with faculty in these respective colleges. These efforts were at a very early stage in the creation of the programming for the Hunt Library, the building designs having just been completed. Participants were shown the floor plans and given a chance to react to the building as a whole, to voice questions and concerns, and to talk about their needs. The focus groups allowed us to gather information about the lack of study spaces available to graduate students and the kinds of spaces and technologies they would use in a new library. The researchers also sought information about how faculty might use a Faculty Commons as well as special-use spaces proposed for the Hunt Library, including a visualization studio and a glass-enclosed "fishbowl classroom" in which instructors can teach special class sessions and workshops viewable to passersby.

During spring 2011 these efforts were ramped up and individual interviews were conducted with 40 graduate students and 25 faculty members across 11 different departments in Engineering and Textiles. Library staff also interviewed more than 30 faculty and graduate students from other colleges and departments around the university. The interviews were conducted in an intensive fashion over an eight-week period by a team of eight librarians. Faculty were interviewed individually, and graduate students were interviewed individually or in small groups, depending on schedule availability. Each interview was one hour in length and took place in the interviewees' work spaces. Interview questions were targeted at specific issues pertinent to Hunt Library planning: current work life and use of existing campus spaces, use of library services and collections, ideas for a Graduate Commons and Faculty Commons, furniture needs, and desired technologies.

B. Learning about our undergraduates

In spring 2010 a team of library staff began a pilot project using the photo interview or photo diary method. This methodology involves giving an interviewee a camera and a set of prompts for taking photos (ex. your favorite place to study). The researcher then interviews the participant using the photos to elicit responses. This method, popularized by libraries at the University of Rochester and MIT, is a powerful tool for learning about students' lives both in relation to the library as well as beyond the library's walls. [2, 9] Following the University of Rochester's lead, our research team used prompts focused on students' use of campus, how they manage their time, ways they keep track of schoolwork, and how they socialize in addition to using the library. The process was viewed by NCSU Libraries staff as so interesting and valuable that the method was used again in spring 2011. Targeted attention was given to how students perceive and use existing spaces, services, and technologies in D. H. Hill Library rather than seeking a more holistic view of their work habits and lives on campus.

Additionally, during the spring 2011 semester, library staff conducted interviews with 13 undergraduate students, primarily from Engineering and Textiles. Many fewer undergraduates were interviewed than graduate students and faculty because the research team believed their experiences were more homogeneous and that more information was known from years of

informal observation in D. H. Hill Library. The Libraries' Student Advisory Board also has been an ongoing source of information about undergraduates' needs since the Learning Commons inception. Students were asked a variety of questions focused on the kinds of academic work they do, as well as behaviors and preferences pertaining to spaces, technologies, and collaboration practices. The interviews revealed invaluable information about how the students work in spaces across campus and beyond in addition to the library. Library staff also spent time formally observing students in the Engineering and Textiles buildings to see how they use existing spaces close to their departments. A research team also conducted a survey about the frequency of studying in groups, group size, laptop ownership, and frequency of bringing their laptops to campus.

Appendix A provides suggestions for using the variety of methodologies the NCSU Libraries adopted when learning about our users, including formal observations, interviews, photo interviews (photo diaries), focus groups, and surveys. Each brief overview is followed by a link to relevant content in the IMLS-funded Learning Space Toolkit, which is a collaboration between the NCSU Libraries, NCSU DELTA, brightspot strategy, and DEGW. At the Toolkit you will find more detailed overviews of each method, links to sample research instruments, and citations to key publications and websites. Please also see the Needs Assessment Resources section of the Toolkit: http://learningspacetoolkit.org/needs-assessment.

V. Working with the user-research data

A. Analysis and reporting

All data-gathering efforts must have a reporting component to disseminate the findings to the larger library organization. In the cases described above, the compilation of data was fairly easy for user-research projects that produced small amounts of data. For example, in the five focus groups of 2009, almost every comment could be included in a summary, and the photos taken during the student observations of spring 2011 were easily compiled into a PowerPoint presentation. Projects with extensive data require more time and analysis and findings are less easily summarized and communicated. The faculty and graduate student interviews of spring 2011 were the most data-intensive projects. Each interview was recorded on a digital voice recorder and a note-taker was present to provide supplementary notes. After each interview, the audio files were turned over to a designated staff member to transcribe. Even though the transcriptions were begun concurrent with the interviews, the large quantity of interviews to process meant an inevitable lag between the completion of the interviews in late April and the completion of the transcriptions. This delay in having a complete set of transcriptions meant that deep analysis of the data could not begin immediately. At the same time, various upcoming Hunt Library decision deadlines meant that some basic analysis was needed to inform immediate decisions. This quick analysis resulted in a report summarizing stated preferences in three key areas: spaces and furnishings, technology, and work schedules. The report also documented general information not explicit in the data, but observable by the interviewers that would be useful to planners: the spaces and furnishings current faculty and students have available on Centennial Campus (i.e, what their offices look like, what kinds of meeting rooms they have available, what technology is available to them, etc.).

The complete analysis of the interview data took place in fall 2011. A list of research areas to target was created and the analysis focused on pulling out responses in these core areas:

- Basic demographics: (college, department, rank)
- Hours on campus
- Office location and where actual work takes place (i.e. campus)
- Work spaces used outside of office
- Technology needs
- Space needs
- Furniture
- Incentives for using Hunt Library
- Personal/face-to-face/real-time library services: both previously used and/or needed
- Needs and expectations of what the Hunt Library can provide or do for the faculty/grad students

This more thorough analysis added richness to the Hunt Library planning team's understanding of trends and discrepancies across departments and campus affiliation (i.e. faculty, graduate).

B. Creating user personas

In addition to the detailed reports, user personas were the other major product resulting from the spring 2011 interviews of faculty, graduate students, and undergraduates. This technique involves creating a cast of fictional characters – archetypal users, each representing a particular core need or set of needs. These characters are fully fleshed out with names, photos, bios, hobbies and interests, and most importantly, their personal story as a user. Personas provide designers with a tool to empathize and identify with users based on their needs. They help staff in design projects avoid sweeping generalizations and keep them from relying on "sacred cow assumptions" that may not be based in reality. These assumptions are often the results of what Adlin calls "hidden personas" or "assumption personas" that each employee is using and basing decisions upon. [10, 11] Every staff member has pictures of the user – an undergraduate, for example – in their mind, and it is unlikely that these pictures match up between them, especially across staff working in different departments. Creating a set of personas for the whole organization helps bring shared understanding and vision. As a result, a roomful of staff can talk about a given undergraduate persona and have basically the same user in mind. Better yet, they can talk about several undergraduate personas and grasp a more complete range of undergraduate students' needs.

According to Adlin,[10] there are two approaches to creating personas – data-driven and ad hoc. Data-driven personas are heavily based on existing data; ad hoc personas rely more on existing organizational knowledge of the user. Our approach to creating personas blended both strategies because we needed to create the personas while the interview data was still being transcribed. Our team mainly followed the ad hoc approach as described by Adlin in her UIE webinar *The Power of Ad Hoc Personas*. [10] However, since the personas were created by the team of librarians who conducted the interviews, the data did significantly inform their creation. The blending of the data-driven and ad hoc approaches was the first of several adaptations of Adlin's method that were employed. Since most overviews of the persona-creation process were created for private industry, additional adaptations for an academic library environment were necessary.

The process takes place in a workshop setting; the first adaptation the team made was to do separate workshops for creating sets of faculty, graduate students, and undergraduate personas. In a different environment one would not segment the user population in this way at the start of the process, since market segmentation is essentially the purpose of creating personas. However, in academic culture these populations are viewed very differently and that is not something that is ever going to change. Additionally, the team felt it would be easier to look at each group differently since the data for faculty, graduate students, and undergraduates came from different sources. The questionnaires used in the faculty and graduate student interviews were slightly different from each other, while the data for the undergraduates was gathered through completely different processes. Lastly, the team wanted the workshop participants to focus intently on each group individually. It should be mentioned that there was some risk to this approach. With three separate workshops, there was the risk of repeating unnecessary effort, as the different workshops might end up producing identical personas. But the team felt the extra time was worthwhile if it meant getting accurate depictions of the variety of personas within each user group.

Three workshops were scheduled, each about three to four hours in length. As previously mentioned, librarians who performed the research with each group were invited to participate, so there were six to 10 people at each workshop (Adlin recommends a maximum of 12). All of these librarians were subject specialists in reference or collection management. This is another adaptation from the standard persona-creation process, which generally recommends that the workshop participants include high-level executives. The thinking behind this recommendation is that personas are a "focus and communication tool first and a design tool second." [10] Adlin argues that in many large organizations, executives can have very different views of organizational goals and objectives, which can lead to lack of organizational focus. So there is a primary need to get all of these key stakeholders on the same page before any design project can begin. For academic libraries, this also may be necessary, but since libraries tend to be structurally more compact and more empowered across the organization, the key stakeholders might include department heads and other staff members. A purely ad hoc process could only involve senior administrators, but since ours was more of a hybrid process that did utilize the data collected, the staff most familiar with that data had to be involved.

The result of the workshops was a group of personas based upon the *user's stated needs*, rather than by any other internally defined categorization method. Appendix B provides information about how personas were created and shows selected personas. The following tables provide a summary of all our personas. As is common practice, our personas were given catchy names indicating a core aspect of their orientation toward the library and their needs. Note that these descriptions are based on the personas' use of library facilities, spaces, and services rather than their orientation to the library's collections and website. Personas focused on website or web application design might have a different focus.

Table 1: Faculty Personas

Faculty	Description	Primary Library Needs	Motto
Tina Tweed	Associate Professor in Textiles Engineering - focused on teaching, primarily sees the library for what it can do for her students	- Needs students to know how to use the library - Course reserves - A space to meet with students, sometimes with special technologies - Training and assistance with technologies - Food and drink	"It's all about the students!"
Larry Leadwell	Professor and Associate Head, Mechanical and Aerospace Engineering - knows faculty and administrators all over campus, long institutional history, knows several library staff by name, frequently in a position to promote the university to visitors	- Attend library-sponsored events - Turnkey professional video-conferencing - A place to meet informally with others - Tours to help impress visitors - Bookable spaces for events - Space to meet with others outside the department - Food and drink	"Wait 'til you see this!
Hunter Powers	Professor, Polymer Science - loves researching in the library, a power-user of the library's print and online collections	- To find and access print content - To fix a problem with my library account in person - To pick up stuff being held for me - Print / copy / scan - Expert research assistance - To use special or alternative format collections - To book a room for a whole semester to meet regularly with grad students - Food and drink	"A library is a library, not a marketplace!"
David Dwells	Assistant professor, Biomedical Engineering – non-tenured and incredibly busy with teaching and research, needs to get away from the constant disruptions of students and family life to read and write	- A place to get away on my own - An office - Food and drink	"I just want to be alone!"

Table 2: Graduate Student Personas

Name	Description	Primary Library Needs	Motto
Ahman Green	Master's Candidate, Electrical and Computer Engineering – international student adjusting to his program and to life in the US, adapting to big classes taught in English, trying to save money as much as possible like many other students	- Print / copy / scan - A quiet place to work - To borrow technologies - Multiple computer screens - To get to / away from library safely and conveniently - Secure place to store things - Space to work with a group - Access to textbooks - An orientation to the library - Food and drink	"Slowly figuring it out."
Sarah Scribbler	Ph.D. Candidate, Textiles and Apparel Management – finished coursework and now researching and writing, spends a lot of time in her office and the library, frequently works with a subject-specialist librarian	- Constant access to library spaces (weekends, late night) - Access to the whole collection and beyond - Quiet place to work without distractions - Specialized technologies - Expert assistance on citation management - Place to practice presentations - Clear guidance on the thesis writing process - Food and drink	"I need everything you have and the best you've got!"

Table 3: Undergraduate Student Personas

Name	Description	Primary Library Needs	Motto
Carrie Newby	Freshman, Fashion and Textiles Management – eager to learn about campus and meet people, wants to study around others	- Attend a workshop with a librarian for my course - Get research and technical help - Somewhere to go between classes where I can be near others - Group study rooms - Learning the ropes of how things work on campus and in the library - Food and drink	"I've still got a lot to learn about being in college, but I do know that the library is *the place* to be around people."
Tonya Crew	Senior, Chemical and Biomolecular Engineering – meets routinely with	- A room booked on a weekly basis - Big tables for spreading out	"I really need my group to get coursework

	groups for course work	- Presentation practice room - A sense that I'm near other students in my field - Food and drink	done and study for exams."
Matthew Camp	Junior, Computer Engineering	- Quiet place to isolate myself, away from friends and roommates - Somewhere I can camp out - Somewhere I can stay late and feel safe - Access to power to plug in my laptop and other technologies - Food and drink	"The Learning Commons is OK if the work is not hard, but now I'm doing the hardest work of my life. I need to isolate myself."
Amir Sahibi	Sophomore, Biology – does not take classes on Centennial Campus but lives close by, meets with a big group of friends in the library every day to socialize and sometimes study	- A space that feels like my own - Big tables for an expanding group - Lounge seating, comfy chairs - Relaxed atmosphere - Food and drink	"The library is where I hang out with my friends."

C. How the data and personas are being used

Planning a new building brings many opportunities and challenges. The fact that the building is a "blank slate" gives tremendous freedom to do things differently both in terms of the space and service design. This openness also means that there is a multitude of unknowns – from gate-count traffic to laptop usage. In addition, at different points the Hunt Library planning team has needed to make decisions with zero or limited access to the actual building. Planning a library that one can only see in floor plan diagrams is incredibly challenging; it is difficult to staff a service point, for example, if you cannot see the people and the equipment in the space. Furthermore, it is hard to know what kind of staffing is needed to support 100 group-study rooms if you have never had more than a handful. The combination of almost unlimited possibilities and so many unknowns has underscored the importance of collecting user data and feedback. All of the data collected by these various means have been used in big and small ways, from making decisions on furniture to providing shared vision for the planning team and transforming the culture of the organization. The process has involved so many overlapping and inter-related decisions that in many cases data initially collected for one purpose were used for several others.

The earliest research from 2009 and 2010 tested our assumptions about what users want and need, and collected early reactions to a library that is unlike any our users have known before. The Hunt Library's design, which emphasizes spaces over collections, redefines the Libraries' role as first and foremost a provider of technology-rich learning spaces. In these early studies, library staff conducting the research were able to talk to users about issues such as the closing of the Textiles Library, the splitting of the engineering collections from that of the sciences, the

relocation of materials into an automated retrieval system (our "bookBot"), and the associated loss of serendipitous browsing. Focus groups enabled us to hear their thoughts on how they would work in this new environment and what services they would need. It allowed us to test service ideas. For example, would virtual-browse technology make up for not being able to browse the collection? Would an office delivery service eliminate concerns over the chemistry collection being separated from the chemical engineering collection? The research team also got feedback on which technologies they thought it was appropriate for the library to provide and which they did not see as beneficial or worthy of library resources.

The research conducted in 2011 helped us better understand engineering faculty and students and the Centennial Campus community. Since 1998, library services to the College of Engineering have been somewhat separated from that of the main library public services and delivered by a team of engineering librarians largely based on Centennial Campus. The result is that most of the Libraries' staff know little about engineering faculty and students, and even less about life on Centennial Campus. Additionally, about three-quarters of the planning team do not have regular, direct access to users, and so this information helped build a shared knowledge base.

The student observations that took place in May 2011 provided photographs of students studying in the engineering buildings. These pictures helped the planning team see the informal learning spaces currently available to students on Centennial Campus. For example, they showed that, although the students are working in brand new engineering buildings, a very limited amount of public space is provided to study and do group work in between classes. They show what could be best described as improvised furniture arrangements in various building spaces – old, beat-up sofas have appeared at the ends of hallways, indicating that there is a need for places to sit and study and students are figuring out a way to make that happen. The photo that perhaps had the most impact was one that showed 12 students studying around one table. Our planning group did not realize that engineers studied in such large groups. At that point, no spaces in Hunt Library had been planned to accommodate groups of that size. Having learned that oftentimes one set of data will be used for many purposes, the researchers also took some quick statistics during these photo-taking observation sessions, counting the number of students observed, the number who had their laptops with them, and the size of their study groups. They also asked students what they liked and did not like about the space and furnishings. Exactly 1,227 students were observed over a four-day period.

The personas helped to further fill in the planning group's understanding of the Engineering and Textiles users. The power of the personas is that they create stories about people that are memorable and to which the planning team can relate. Through the stories of the various personas, the planning team learned things such as what an engineering student's workload is like and what tools they use every day (most of the planners were unfamiliar with engineering paper!). The graduate student personas brought to light the struggles of new (oftentimes international) graduate students struggling with large classes and limited funds and transportation. By learning about four archetypical faculty members, the planning team members were able to understand the needs of hundreds of real ones. The personas also were used directly in an activity called "journey mapping" in which every potential service is analyzed or mapped from beginning to end. [7] So, for example, when creating a journey map of a student picking up a reserve book, the planning team might specifically think about the undergraduate

persona Tonya Crew (see Appendix B) checking out a reserve textbook and follow her progress from the front door to the service desk and through the building. Since the planning team members have a complete picture of Tonya they can envision what services and resources she is likely to utilize. This journey mapping was an extensive and very time-consuming task in which every planning team member participated. Lastly, as the Hunt Library service model has begun to take shape, it has become clear that there will be a need for training and team building for public services staff well before the Hunt Library opens. The personas will be an important tool to use in staff training, creating a shared understanding of the users and user needs.

VI: Conclusion: What the NCSU Libraries learned about conducting user research

Perhaps the most valuable outcome of the past two years of user research has been instilling within our organization a greater culture of asking questions, observing, and listening to our users. Library staff found that there are a wide range of methodologies that can be used to connect with users to learn more about what they need to do, the resources currently available, and the gaps. The staff involved in user research learned that it is not necessary to be pros at user research before diving in and figuring it out along the way. From our experience, all efforts lead to new knowledge and a greater sensitivity to those we serve. The NCSU Libraries now have a small, core group of staff who have gained experience facilitating user-research projects while finding opportunities for many other staff to contribute. Although user research takes time and energy, the results – deeper understanding of student and researcher needs – enables better, more thoughtful decisions that keep the users at the center. The NCSU Libraries now are poised to continue our efforts with user-experience research and respond to changes in user needs, behaviors, and preferences both in the new Hunt Library and existing libraries on campus.

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Appendix A: Tips for using the research methodologies

Before gathering data about users it is important to talk with representatives from the institutional review board for researching human subjects on your campus. It may be that your IRB office will provide a blanket exemption for any research that is used to gather feedback for improving services and spaces. When a target population is being intentionally studied as a population rather than approached simply for gathering feedback, you may need to submit IRB paperwork. Check with your local IRB office for guidance.

Below are brief suggestions for using the methodologies we adopted when learning about our users. Each method is followed by a link to relevant content in the IMLS-funded Learning Space Toolkit, which is a collaboration between the NCSU Libraries, NCSU DELTA, brightspot strategy, and DEGW. At the Toolkit you will find more detailed overviews of each method, links to sample research instruments, and citations to key publications and websites. Please also see the Needs Assessment Resources section of the Toolkit.

I. Formal observation

Observing users within the library as well as other informal learning and socializing spaces on campus is an inexpensive way to learn more about users, especially undergraduates and graduate students. All that is needed is one or more persons who can spend time observing and taking notes. It is best to repeat observations of a given location on different days and at different times in order to obtain the most holistic view of the spaces and activities. This method can be helpful for learning more about where students go on campus outside the library and becoming more acquainted with the strengths and weaknesses of available non-classroom learning spaces. The observers may couple their notetaking with short interviews with space users and photos of the spaces in order to capture additional information.
More resources at the Learning Space Toolkit: http://learningspacetoolkit.org/needs-assessment/gather-data/observation

II. Short surveys

Surveys can be used to capture information about users' preferences and behaviors in an efficient manner. It can be difficult to create detailed and comprehensive surveys as well as to identify and reach an ideal study sample. As a result, the authors recommend using surveys in a lighter way by creating focused, short surveys and reaching out to students however possible. We found it effective to target students with paper surveys and to compensate them with candy. Our survey focused on only two topics with a total of nine multiple-choice questions. Creating survey questions can be difficult so test the questions with representative users (ex. library student assistants) to check for clarity and comprehensiveness. Begin the survey with a question asking the user if he or she grants permission for the library to include his or her survey results anonymously as part of the data and share it with others both in and outside the library. Obtaining this consent ensures that your survey data respects the users. You should also check with your institutional review board for best practices.
More resources at the Learning Space Toolkit: http://learningspacetoolkit.org/needs-assessment/gather-data/surveys

III. Interviews

Interviews are useful for gathering information about users' current behaviors, preferences, needs, and aspirations. Our research team found this method useful for all library users – undergraduates, graduate students, and faculty. Interviews can be conducted one-on-one or in small groups. The method allows the interviewer to adapt the questions on-the-fly based on the flow of the conversation. Interviewing is time-intensive, however, because it involves scheduling, transcribing and/or note-taking, and processing the information from the interviews as well as conducting the interview itself. Interviews are best when the interviewer can establish a rapport with the interviewee. Some staff may be more adept at building this rapport than others. Depending on your project's objectives, you may need to conduct 10 to 20 interviews. Some projects, such as ours, might benefit from even more.
More resources at the Learning Space Toolkit:
http://learningspacetoolkit.org/needs-assessment/gather-data/interviews

IV. Photo interviews / photo diary

The photo-interview / photo-diary technique is a rich means of gathering information about users' behaviors and experiences; the coupling of images with the interviewee's recorded voice powerfully captures the user's experience. A small number of photo interviews – 10 to 12 – can reap good results. Like regular interviews, this method is time-intensive due to scheduling, interviewing, and post-interview processing of data. Additionally, it is necessary to check out or assign a camera to the interviewee and arrange for it to be picked up and returned, thereby potentially complicating scheduling. You may wish for the interviewee to have the camera for several days. When creating prompts for the interviewee to photograph, keep in mind that not all items need to produce big answers or focus on serious topics. During the interview it is useful to capture the photos and discussion with a screencasting / recording program such as Camtasia or QuickTime (Mac). Recording the images and discussion together as one file allows the interviewer to create video clips from the interview to share with stakeholders in the library. This method is great for undergraduates, who tend to enjoy the photo-interview method.
More resources at the Learning Space Toolkit:
http://learningspacetoolkit.org/needs-assessment/gather-data/photo-interviews

V. Focus groups

Focus groups are designed to bring homogeneous groups together to discuss topics and gather feedback. The "homogeneous" nature could be centered on their status on campus (freshmen, undergrad, grad, faculty, administrator, staff) or some other affinity such as college affiliation or use of a particular existing space. Focus groups should have at least three people and no more than eight. It is best to work from an outline / script for the focus group and to have a facilitator and notetaker present.
More resources at the Learning Space Toolkit:
http://learningspacetoolkit.org/needs-assessment/gather-data/focus-groups

Appendix B: Selected User Personas

The personas are created in a workshop setting. The process begins by identifying existing ways an organization categorizes and describes its users and ends with basic outlines or "skeletons" of new user categories, based on user needs. Each skeleton is given a descriptive and memorable name, a personal biography, and a story as a user to complete the persona. The full persona process based off our experience is detailed in the Learning Space Toolkit at: http://learningspacetoolkit.org/needs-assessment/data-into-action/building-personas-tool. Select persona examples are listed below:

Tina Tweed,
Associate Professor,
Textile Engineering
"It's all about the students!"

ABOUT ME
- 41 years old
- Married with two children, ages 7 and 10
- Originally from Birmingham, UK
- PhD, Mechanical Engineering,
  University of Manchester
- Tenured, with the University for 13 years
- Hobbies: knitting, needlepoint and crochet

MY NEEDS
- My students to know how to use the library.
- To put stuff on reserve for my courses.
- An alternative teaching space.
- To book a room to meet with my students.
- A room with special technology to use with my students.
- Training or assistance using technology in the library.
- Food and drink

WHAT'S YOUR WORK LIFE LIKE?

I am a member of the Textiles faculty and so I have always worked on Centennial Campus. I rarely go over to main campus except for special meetings. Most semesters I teach two undergraduate courses, one of which has an associated lab. I have a TA to help cover the lab sections and do the grading, so that helps. I also officially advise about 20 students per semester, although informally it's probably a lot more. Students have a tendency to knock on my door when they need advice or just to talk. I generally work about 6 days per week during the regular semester. I have small children so I try to work from home on the weekends if possible.

I have a small office, just like everyone else in the College. I try to make it a bit more warm and welcoming for students (I secretly painted over the standard battleship grey color a few years back – that made a big difference!). Still, I can only meet with one or two people comfortably in there. Sometimes I go to the Port City Java to meet with students and faculty; it's a nicer environment, and they have a small conference room you can book.

HOW DO YOU USE TECHNOLOGY?

Basically I just use what they give us. The standard technology provided in our classrooms has become something I can't live without. I am really interested in new technologies that might be useful in the classroom, but to be honest I don't have the time to investigate them.

HOW DO YOU USE THE LIBRARY?

I don't really use the library. I mainly just get my journal articles through Google Scholar, and I bookmark my favorite e-journals. Really, I think the library is for the students, but I truly value all the library does for them. I put about a dozen books on reserve in the Textiles Library each semester and sometimes I use the library to hold an exam (the classrooms are very tightly packed and students need space during a test). I really believe that engineers need to know how to search for information, so I work with our reference librarians and bring them into class once a year to go over the important engineering resources.

TONYA CREW

"I learn by studying with other engineering students. I really need my group to get my coursework done and study for exams."

ABOUT ME

- 21 years old
- Senior, Chemical and Biomolecular Engineering ("CHEM E")
- Hunt Library will be a great place for routinely meeting with groups for class projects.

MY NEEDS

- A room my group can book on a weekly basis
- Big tables for spreading out my stuff
- A room for practicing presentations, one that feels professional
- A sense that I'm near other chem-e students
- Food and drink

WHAT'S IN MY BAG

- Calculator
- Engineering paper
- Big fat textbook (expensive!)
- Handwritten class notes
- Daily planner
- Laptop (some days)
- Wolfpack sweatshirt because it's cold all over campus!
- Cell phone

WHAT'S YOUR SCHOOL WORK LIKE?

Problem sets are pretty much my life as an engineering student! The problems are really challenging every week. Actually, this is the hardest semester for me ever. I usually work on the problem sets on my own and then I get together with my assigned group members. We have to turn in the homework together, handwritten on engineering paper. It's great because I always learn from talking about the problems with my group members. It's hard for us all to get together because everyone's so busy with their classes, work, and other activities. Our exams are really tough too. I don't know how I'd get by without meeting up with classmates to study together for exams.

In my CHE 450 course I have to do a group presentation with two other students. We divvied up the work since it was impossible for us to find many times when we could meet. But we put the presentation together and practiced the whole thing a few times in one of the EB 1 classrooms that was empty. It felt like we shouldn't be there though.

WHERE DO YOU STUDY?

I've got my routine down! My classes are mostly on Centennial Campus. I usually study in between classes in EB 1. I like studying there because it's close to my classes and my TA's office is there. I can get food and I like that I often run into other biochem-e majors. I like to study near other engineering students because I sometimes run into classmates and also I think they just get what I'm going through.

For my CHE 415 course we meet every Tuesday night at the library to work together on our problem sets because the library's the most centrally located place to where everyone lives. We usually try to get one of the group study rooms but sometimes that's not possible. If we can't get one, we'll find another spot – like the purple wavy bench. Then we'll grab a big whiteboard. Or we'll get a bigger table in EB 1. Either way, we need a lot of room to spread out all our stuff.

For exams I meet up with classmates (anybody who can come). We usually pick a big table in EB 1. We'll camp out for hours. We need to spread out a lot of stuff. Actually, any time I study I have a lot of stuff I need so I like to spread out like mad!