



Using Visual Ethnography for Space Studies

Prof. Pauline Melgoza, Texas A&M University

Ms. Melgoza is a science and engineering librarian at Texas A and M University. She has 19 years of experience.

Prof. Tina M Budzise-Weaver, Texas A&M University Libraries

Tina Budzise-Weaver is a Humanities & Social Sciences Librarian and Associate Professor at Texas A&M University Libraries. She is the subject liaison to Visualization, Dance, and Performance Studies. Her research investigates the under-utilization of libraries, barriers to access information, and the creation of new services to address academic and professional success among her students, faculty, and fellow librarians.

Dr. Sarel Lavy, Texas A&M University **Miss Tiyamike Kunje**

Using Visual Ethnography for Space Studies

A space usage study was conducted of the College of Architecture and the College of Education & Human Development on the Texas A&M University - College Station campus. This study used visual ethnography to document when and where these colleges' undergraduate and graduate students study. The goal of the study was to use this information to inform the library in planning space usage for these student populations. This paper discusses how students use personal and public spaces in their departments, the library, and what they deem as necessities to complete their "home away from home" on-campus experience. The photos and gps database will be added to the library repository collection for future researchers to use.

Introduction

The Texas A&M University (TAMU) Libraries are an important hub for students' studying needs. However, have we optimized or enhanced the spaces for optimal student usage and occupancy? Can we assume that technology, operating hours, location on campus, services, and furniture determine the usability of the spaces? Over the past decades, the TAMU Libraries have renovated spaces as a reaction to safety, ADA, energy consumption, and technology issues. Sometimes, another university library's renovation has inspired renovations such as Duke, University of North Carolina, and North Carolina State libraries. Recently, the TAMU Libraries have undertaken several renovation projects to address insufficient instruction and study spaces and improve and consolidate service areas in addition to other issues. The Sterling C. Evans (Evans) Library renovated the first, fourth, and sixth floors to improve student spaces and instruction spaces that the students can use when not in use. These renovations included improvement of student study spaces, renovation of the coffee shop, creation of a prayer room, and a graduate study lounge. Other libraries on campus had similar renovations. The renovated spaces are popular with the students.

In fall 2018, the researchers won a \$35,000 grant from the T3: Texas A&M Triads grant program to research study spaces on the TAMU - College Station campus. The grant covers two colleges, College of Architecture and the College of Education and Human Development. This study used a photo questionnaire to capture the students' study experience through ethnographic evidence on campus. The goal of this research is to inform the Libraries of student study space preferences so that the findings can be considered when creating and/or improving spaces in the five libraries across campus. To finalize the study, the researchers will create an open collection of campus images with global positioning system (gps) information for future space study researchers to use.

Literature Review

The focus of most studies on University spaces has been based on the student engagement framework to explore the role of various study spaces on the university campus (e.g. [1], [2], [3], [4], [13]). Riddle and Souter [5] argued that current practices in designing student

study spaces ignore students' perspectives and reproduce environments that are familiar but less suitable for active peer learning and learning supported by technologies that students prefer. Although many researchers have attempted to find the students' perspectives through various survey instruments, not many have used ethnographic surveys. A study by Harrop and Turpin [3], explored learners' with photographic mapping (using pictures as a survey tool) informal learning space behaviors, attitudes, and preferences within and outside the context of the library. They created nine learning space attributes which address aspects of learning theory, place making, and architecture. The nine attributes are: destination, identity (ambience), conversations (interpersonal communication), community (common purpose), retreat (private space), timely (on demand access), human factors, resources and refreshment. When it comes to informal studying spaces Matthews et al [1] found that students who used informal social learning spaces report significantly higher levels of engagement in comparison to those students who do not use such spaces. On the other hand, Mallon [6] stated that when it comes to student place making, a campus setting is important to the success of learning and enhancing the collegiate conclusion. There are multiple papers on library usage but little is being researched on departmental space experiences. Mallon further states that learning is a behavior that can be best achieved in a positive environment, an area that has a certain set of favorable or preferred conditions that create a sense of belonging, security and comfort.

There are many articles on library space research compared to other campus learning spaces. Matthews and Walton [4] did a study to provide strategic direction to the development of physical spaces in a Library. The objective was to create flexible spaces that have multiple functions, spaces where students, staff and visitors can sit, relax and eat. In a literature review article on library space studies, Gray et al [7], argued that the key to understanding how library space can be transformed is through knowing the basic elements of space and the social geography of that space. The endeavor is most successful when it is based on patterns of behavior or preferences of those who actually use library space. Block [8] wisely says that "change must be based on a demonstrated need and not merely a perception of need."

Rood [9] believed it was critical that students are considered genuine stakeholders when it comes to making decisions when designing university spaces. University administrators' decisions have a direct impact on the day-to-day experiences of these students. In a study done by Holder and Lange [10], user reactions were assessed in two busy branches of a newly designed library and the results were used to furnish other libraries on campus. This was a risky study because it would be difficult to change the elements of the design should the feedback be negative. With the advent of digital media and online information services, libraries are being challenged as the traditional destinations for information. In addition, libraries are increasingly being transformed from housing collections of books to those more concerned with user comfort. An article done by Yoo-Lee, et al. [11], explored how undergraduate students perceive and use spaces in the library and why they use them. The aim of the paper was to try to understand collaborative and social spaces which millennials like to use frequently. Current practices too often ignore students' perspectives and the result of this are physical environments that are not suitable to the students' learning styles [5]. Researcher, Briden [12], conducted a study using photographic surveys and mapping diaries to gather data for her *Undergraduate Research Project* at the River Campus Libraries, University of Rochester. Using a disposable camera

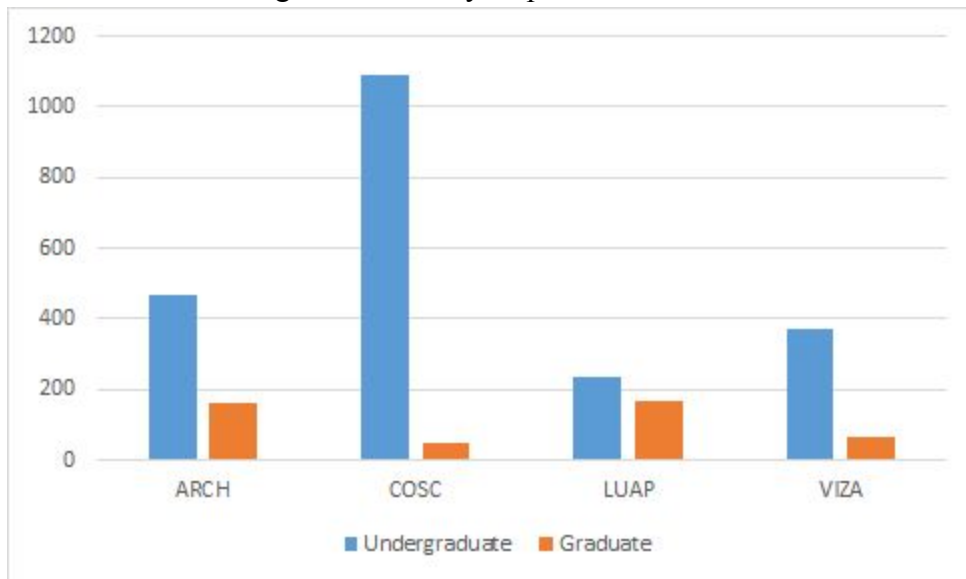
wrapped with a list of questions, the student participants were instructed to complete each task/question by taking a picture as their answer. Upon completion the students met with investigators for a final interview. Briden and investigators learned how students like to study, relax, and organize their school and home life. They discovered why library buildings were popular since dorm rooms were not always conducive to long periods of working on assignments. “Distractions” was sighted as a main reason to get out of the dorm. Gathering these insights have helped the researchers design better signage, spaces, and realizing that they can be doing more to navigate undergraduate students through the libraries’ list of services, spaces, and resources [12]. A student in another study said “Learning- I think it happens all over ” [13].

Various methods of research have been used in multiple studies namely, questionnaires, interviews, observations and photo mapping exercises (e.g. [1], [2], [14], [15], [16], [17]). In one of the few photo ethnographic studies, Thomas [18] did a photo diary study with undergraduate ambassadors to investigate Rice University’s Fondren Library services and spaces. Her success with the study informed our research project. However, there is still a gap in the literature for the use of photography in ethnographic studies.

Background of College of Architecture

In fall 2019, the College Station campus had a total enrollment of 69,465: 54,476 undergraduates (ungr) and 14,989 graduate students (grad) [19]. The College of Architecture has four departments, Architecture (ARCH), Construction Science (COSC), Landscape Architecture & Urban Studies (LAUP), and Visualization (VIZA). There are 3,142 students and 177 faculty [20]: 2,703 undergraduate students and 439 graduate students [19]. Further, there are 2,018 males (53.2%) and 1,124 females (46.8%). COSC, the largest department, has 1,091 students (1,043 ungr/48 grad), ARCH 632 (469 ungr/163 grad), VIZA 436 (373 ungr/63 grad), and LAUP which is the smallest has 398 (233 ungr/165 grad). See Fig.1.

Fig.1. Students by Department



Methodology

The purpose of this study is to investigate through ethnographic evidence and qualitative and quantitative analysis how students perceive academic college campuses in regards to study and classroom space for use. This study allows participants to comment on their preferred study spaces, which included existing and newly renovated spaces in their departments. An IRB (Institutional Review Board) application was approved to investigate students' perceptions and usage of study spaces in their respective colleges on a university campus.

Study Instruments & Data Collection

The research process consisted of two stages. The first phase of the study enrolled participants from the College of Architecture. The second phase of the study is enrolling participants from the College of Education & Human Development. The researchers have currently enrolled 70% of these students. The researchers asked the students to participate in four activities:

- 1) Complete a demographic survey
- 2) Review a tutorial on how to use Google Photos, adhering to surveillance rules on campus
- 3) Answer a series of questions using photos and text comments and uploading this content to Google Photos
- 4) Complete an exit interview with the principle investigator to finalize study

Campus bulk email distribution was used as a recruiting tool to enroll student participants. In total, 64 students responded to the initial recruitment email with 46 students enrolling, and 30 students completing the study. Participants started the study with a short demographic survey in Qualtrics, an online survey administration software, collecting the student's department affiliation, classification, gender and nationality. A tutorial was designed by the Libraries' instructional designer in collaboration with the researchers to instruct students on how to comply with surveillance policies on campus, i.e. avoiding photographs with non-participants identifiable faces and personal data. The tutorial also educated students on how to utilize and upload photos to the chosen photo tool. The students were given a questionnaire of 18 questions and asked to answer the questions with a photo. They were asked to make a few comments or tags associated with each photo uploaded in their assigned Google Photos folder. Google Photos was selected because the university's students receive Google accounts upon enrollment, and Google Photos is a free tool available to each participant. Google Photos allows for folder sharing, comments and tagging, and the collection of GPS data. Lastly, an exit interview was administered with the participant to clarify photos and study space experiences. The students were asked to complete the study in 16 days, and were given a gift card upon completion.

Grounded Theory

The qualitative data collected through photographs and photo comments was analyzed using the grounded theory approach. Grounded theory involves the development of original theory from the systematic examination of data to construct concepts or themes, versus preconceived perceptions of data or generation of explanations based on generalizations of data [21]. Qualitative analysis is often utilized in the social sciences, such as sociology and social anthropology, with analysis occurring “at various levels of explicitness, abstraction, and systemization” [22]. When developing grounded theory, the researcher’s objective is to develop a set of “categories (themes, concepts)” that through analysis of the qualitative data, elevates core concepts to the level of theory by conceptual ordering of the data [23]. To create the elevation of core themes or concepts in qualitative data, the method of qualitative coding is used to extract and conceptualize the data for interpretation. In grounded theory analysis qualitative codes emerge directly from the data present, allowing for a foundational analysis and the development of a theoretical framework to inform further data collection [24].

Due to the nature of the data, textual interviews and visual imagery, visual grounded theory was applied to the photographs upon analysis. Visual grounded theory, formulated by Konecki [24], is research designed within the parameters of grounded theory, but relies on visual data and visual social processes to construct theory. He notes observing the images in four contexts: creating the image, participation in the image, the visual communication of the image to others, and the reception of the image and its visual aspects [25]. The researchers utilized the following three techniques, adapted from Charmaz [24] and cited in Budzise-Weaver [26], to analyze images:

- What is the structure of the image, and which categories can you discern from the image?
- Are there unintended/intended information and meanings in the image?
- What kind of comparisons can you make between images?

The researchers applied a two-fold approach to create qualitative codes when reviewing the photographs submitted by the participants. The College of Architecture photographic data was analyzed through Open Coding and In Vivo Coding using *comparative analysis*, comparing coding analysis methods and the evaluation of newly introduced data against past data to create a theoretical framework during the ongoing analysis process [20], [26]. Open Coding is the process of creating codes from the data and the discernable attributes of that data that is present to the researcher [22], [24] In Vivo Coding is the practice of utilizing the participants’ data--e.g., a phrase from an interview, comments on the photographs--as the code to capture the research participants own words, thoughts, or concepts [28].

Two researchers, the primary investigator and the graduate assistant researcher, divided the participants’ folders of photographs, and coded the initial codes in their respective ATLAS.ti projects. In the qualitative analysis software used for this study, each image is presented as a single primary document and is codeable with an unlimited number of words, segments of words, or phrases. First, the participants’ photo comments and exit interviews were applied as In Vivo qualitative codes to represent the participants’ perspectives as presented directly in the data.

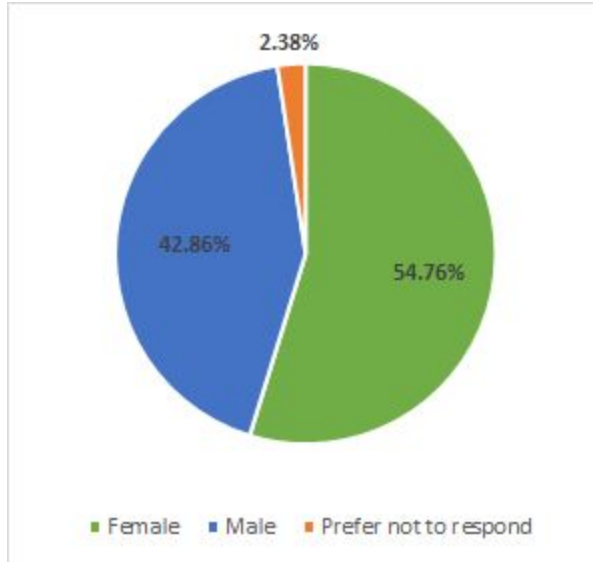
The researchers then created additional Open Codes from the photographic images based on visual attributes present in the images in order to capture concepts not present in the In Vivo coding analysis. These Open Codes, termed “researcher codes” will be utilized when further developing the core themes once the data from the College of Education & Human Development is integrated into the data set. The total number of photographs coded thus far is 623. The two researchers met periodically to discuss coding themes as they analyzed images using the In ViVo and Open Coding methods. A consensus was formed around eight preliminary code themes. The researchers observed that “theoretical sufficiency” was reached with 30 participants completing the study in the College of Architecture [29]. Theoretical saturation, often referred to in grounded theory research, is the finalization of the conceptualization of the data, whereas theoretical sufficiency is the categories, i.e. preliminary code themes, which are developed, but not reaching the level of saturation [29], [24]. The preliminary code themes created are subject to change, evolving when researcher codes and codes from the additional college are integrated into the ongoing analysis through *comparative analysis*. These preliminary code themes are evidence of building towards greater hierarchical coding once new data is eventually introduced, illustrating the process of qualitative coding in social research data.

Results

Demographics

The researchers enrolled 46 students in fall 2019, with 30 students completing the entire study over the semester. The researchers gave the students 16 days to complete the study, but distributed all of the study instruments together to allow the students to finish sooner. Of the 46 students who enrolled, 42 responded to the survey, with 4 students dropping out before initiating the survey. An additional 12 students dropped out after completing the survey. The demographic survey collected department affiliation, classification, gender, and nationality. The survey limited gender to female, male, and prefer not to respond. Gender was not tied to the individual participants, but kept anonymous. The majority of students identified either male or female, with one student identifying as prefer not to respond. See Fig. 2.

Fig. 2 Gender



The following data is representative of the 30 students who completed the survey in its entirety: survey, photo questionnaire, and interview. The sample of 30 participants contained 20 undergraduate students and 10 graduate students, see Fig. 3. From the undergraduate sample, two students were sophomores, eight juniors, nine seniors, and one unknown.

Fig. 3. Study completion.

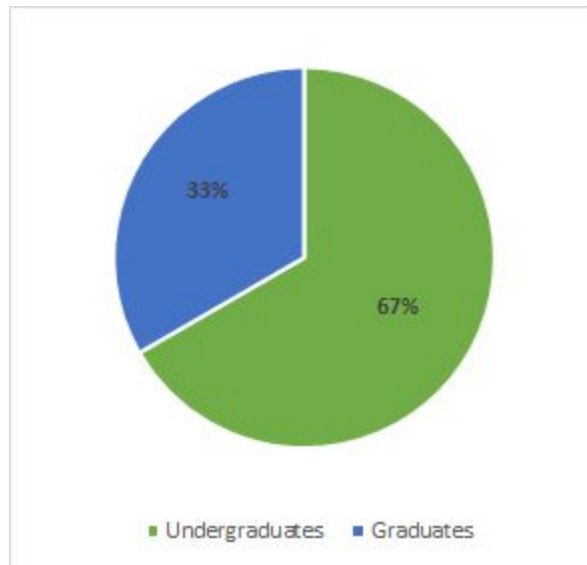
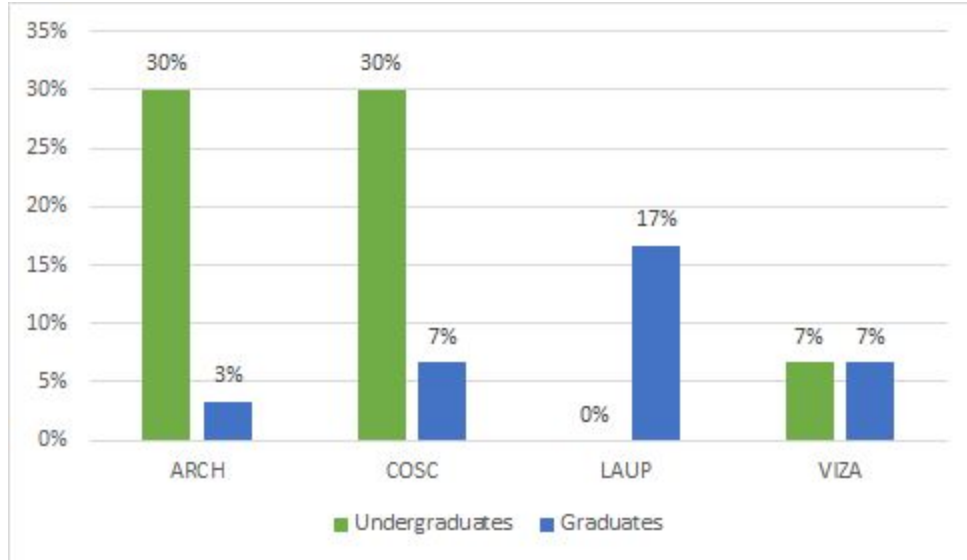


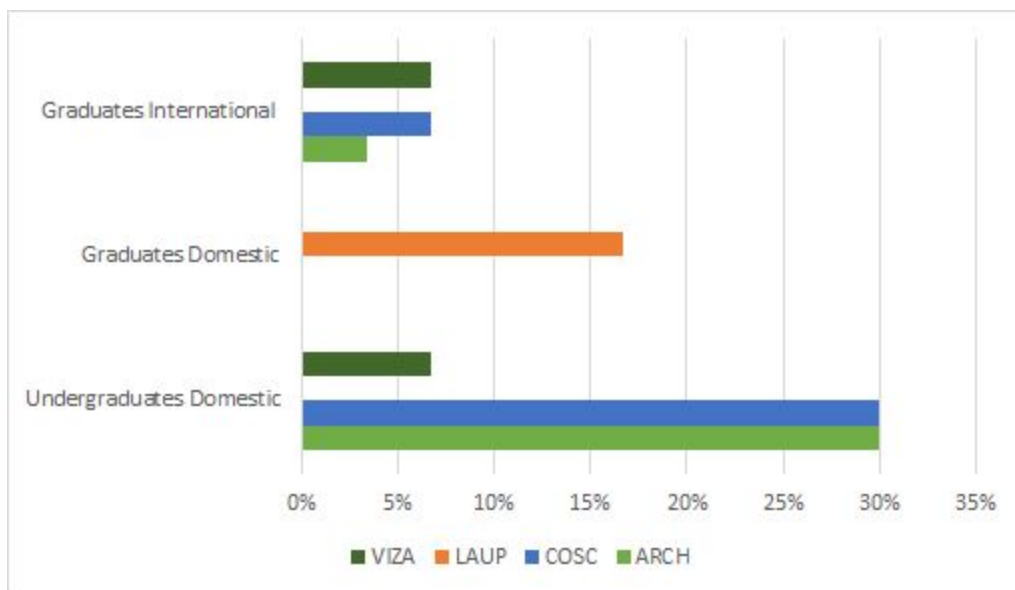
Fig. 4. Study completion by classification & department.



The study sample contained students from four departments in the College of Architecture. The highest percentage of undergraduates are majoring in COSC (30%) and ARCH (30%), with the lowest percentage of undergraduate participants majoring in VIZA (7%). The highest concentration of graduate students in the study are majoring in LAUP (17%), with the lowest percentage of graduate students majoring in ARCH 3%. See Fig 4.

Within the study sample, the undergraduates all reported as domestic students (67%). The graduate students were more diverse, with 17% reporting as domestic and 17% reporting as international. Fig.5 illustrates the study participation by nationality in the context of the students departments.

Fig. 5. Study completion by nationality & department.



Photograph Analysis

ATLAS.ti quantifies the initial codes through code occurrences, how many times the initial code is grounded/coded to the document, or in this case, the photographs [30]. Creating overarching codes allows for the categorization of the initial codes into preliminary code themes. The researchers are using the code frequency to depict how the students were represented in the eight preliminary code themes. The preliminary themes allow for the researchers to theorize the students' perception of importance when selecting a study space based on their comments. This importance can help information libraries on how to design future or renovated study spaces. As the campus population expands, more available space is needed in the library to accommodate student study.

The 623 photographs taken for the study questionnaire were ingested into ATLAS.ti for qualitative coding. The two researchers coding looked for similarities and patterns in the initial codes to create the following eight preliminary code themes. The researchers could see themes emerging as they coded the images, and met to form a consensus on the perceptions and values students' illustrated when describing their ideal study spaces. This process included listing overarching categories discovered through the initial codes on a whiteboard, then condensing recurrent initial codes into eight manageable code themes. The analysis required the researchers to think about the codes narrowly, such as noting laptops, printers, and wifi as priorities to the participants, but eventually condensing into the broader category Technology. In creating Study Climate, the researchers reviewed and condensed codes pertaining to comments mentioning the existing environment, elements the students adapted to, but generally could not change. This analysis continued for each preliminary code theme to group the students' study preferences into broader, overarching categories for discussion. The following preliminary code themes emerged from the data set: Controlled Study Environments, Study Climate, Study Materials & Accessories, Comfort, Technology, Proximity to Amenities, Safety, and Access to Help. To create these eight preliminary code themes, the researchers coded 1,856 code occurrences, the frequency of the initial codes, generated from the students' comments and interviews. The following percentages are the combined code frequencies for undergraduate and graduate students.

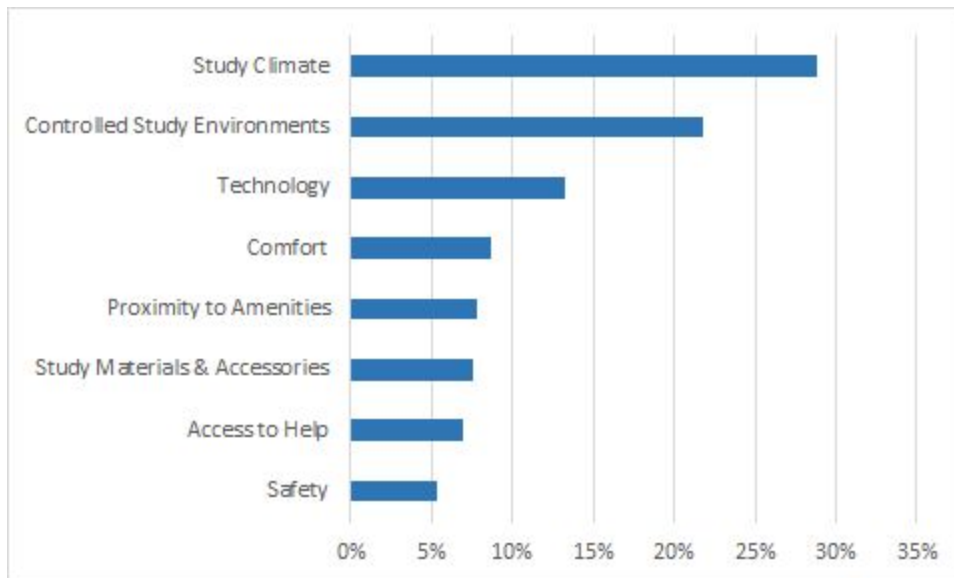
The undergraduates and graduates collectively viewed Study Climate (29%) and Controlled Study Environments (22%) as two of the more important factors for optimal studying. The students made comments such as quietness, group study, preferred study hours, and the overall broad generalization of the locations and atmosphere (outdoors, isolated or public study locations) as desirable in Study Climate. Controlled Study Environments encapsulated comments that focused on the student's desire to have more control over their study location. This included the ability to control lighting, temperature, noise, creating spaces or environments, and dedicated study lounges for graduate or undergraduate students.

Technology (13%) was important for student study as a lifeline to their assignments. This theme included the desire to have available technology in their study locations, for example WIFI, electrical outlets, laptops, printers and access to computer labs. The themes Comfort (9%),

Proximity to Amenities (8%), and Study Materials & Accessories (8%) illustrate the needs to create the perfect study experience. Comfort included comments that reflected the overall contentment of the chosen study location, such as comfortable couches, large tables, and size of room. The students also had a strong preference towards their Proximity to Amenities, which included distance to food (restaurants) and convenience of getting from home to the College of Architecture buildings on campus. Study Materials & Accessories captured the objects or material possessions that were needed to complete the perfect study space, like textbooks, coffee, highlighters, and headphones.

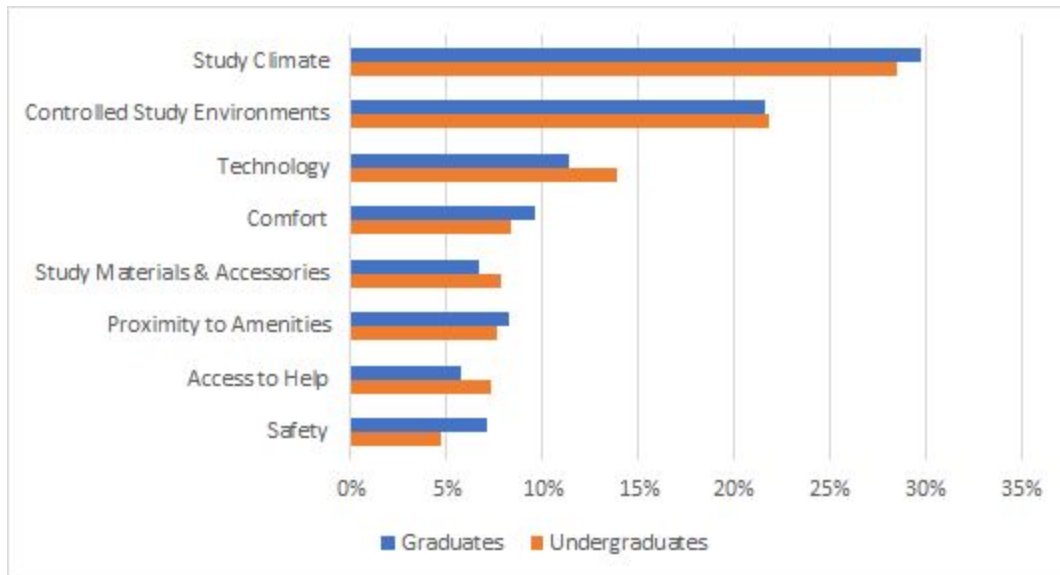
Access to Help (7%) and Safety (5%) played a part in the students' selection of study locations. Access to Help focused on who and where they sought help outside of the library, comments mentioned professors, teaching assistants, departmental administrative offices, or online help, like Google. The students in the College of Architecture are in a unique position, as they have 24 hour access to their buildings with their student IDs, activated as a swipe card. Safety was mentioned as a necessity to work during the evening hours or middle of the night, an ability not offered through all colleges on campus. The total code frequency based on preliminary code themes are illustrated in Fig. 6.

Fig. 6. Preliminary code theme frequency *percentages are *preliminary code theme* divided by *total code frequency*



The researchers compared how undergraduate students versus graduate students perceive study spaces based on the eight preliminary code themes. The total code frequency for undergraduates was 1,347 and 509 for graduates. The researchers compared their code frequency in the following Fig. 7.

Fig. 7. Undergraduates vs. graduates code theme frequency



Comparatively, undergraduates and graduates showed similarities in how they commented on their preferred study spaces. Study Climate and Controlled Study Environments were still of utmost importance and commented upon most frequently. The code frequency reached nearly 30% for each of these themes. Technology was next with 14% of code frequency for undergraduates and 11% for graduates. Comfort, Study Materials & Accessories, Proximity to Amenities, Access to Help, and Safety ranged from 5% to 10% of the code frequency each, reflected between undergraduates and graduates.

The researchers discuss how these preliminary code themes from the College of Architecture can be utilized as evidence of desired study spaces and how these student preferences can be incorporated into library space planning and renovations.

Discussion

After collecting and analyzing data from the College of Architecture, the photographs and textual/verbal data were analyzed to give a better and more informed picture on the types of spaces that students prefer and for what activity they are mostly used for. This data, and future data, will be a learning point on how to better manage academic spaces efficiently for social and curricular use. Due to the intensity and demanding nature of College of Architecture programs, many students spend much of their time working on projects and have optimized their spaces to best suit their demands, for example, putting up hammocks for naps when they do not have time to go home at night or during the day, and taking blankets to control temperature. Their assignments are specialized to their majors and so is their furniture and equipment, e.g. large tables, printers, etc.

The photographs, student comments, and interviews helped paint a picture of how students in the College of Architecture utilize space. From the preliminary code themes, Study Climate and Controlled Study Environments were foremost on their minds. The contextual

comments and photographs taken, validated the students' perceptions of ideal and flexible study spaces. In response to Study Climate, students noted the ability to use classrooms and conference rooms when unoccupied. The Evans Library & Annex recently renovated to allow students to use instructional spaces as open computer labs when not in use. Conference rooms, classrooms, and labs convert to flexible study spaces at the College of Architecture's Langford Building complex, in addition to the ability to utilize adjacent outdoor spaces for study. This included an outdoor skyway with patio tables and plants, plus a ground level patio space used for study within the Langford Building complex. The Evans Library has one outdoor patio space with a few tables, but there is a lack of an authentic green space within the Libraries' footprint. Students found the curated outdoor spaces at the Langford Complex peaceful and noted they were relaxing. To further understand the granular desires of the students' study experience, the data captures how the students control, create, or manipulate their environments (Controlled Study Environments) for optimal study. The students tend to frequent their campus buildings at all hours of the day and night. To optimize the spaces provided, they cited the availability of graduate or undergraduate student lounges, designated studio spaces with assigned desks, unoccupied classroom use, and the ability to control lighting and temperature. The Evans Library created a graduate study lounge several years ago, which some of the graduate students noted they used occasionally. The dedication of space for study, tailored to classification is highly desired for both undergraduates and graduates. Carving out quiet time in a noisy library or department on campus is still a challenge. The Evans Library frequently has noise complaints on designated "quiet" floors.

As we move into more of the curriculum being accessible online, Technology was a constant concern, whereby the students noted availability of printers, laptops, and computer labs. As libraries are purchasing more and more electronic resources, students still have the desire to print articles, assignments, and notes from their online learning modules. Architecture students utilize software and programs to design and create computer generated projects. Although the Evans Library and Annex have computer labs and even a special studio space for media and design creation, the hours for these spaces are somewhat limited in comparison. The Annex stays open 24 hours 55 days a week, which provides several locations with open access computer labs. The Evans Library closes at 2 am 5 days a week. Although this seems generous, the Architecture students have 24 hour swipe card access to their designated buildings, allowing for greater flexibility based on their preference and schedules. In comparison, the library is always staffed when open, but these disciplinary buildings are not. Can students be trusted to use an unmanned library, or is that a question for the future?

The students commented on the elements that make up their ideal study spaces. The preliminary code themes Comfort, Study Materials & Accessories, and Proximity to Amenities were indicators of the important factors that students either sought out or tried to create in a study environment. These elements tended to be comfortable furniture or large tables to complete work, even sometimes creating sleep areas within a nook in a studio or lab in their department. The perception of feeling like a space was homey, calming, quiet and even dark, influenced the students' selection of a study space. The library has a more systematic design to space with little leeway to adapt spaces, there are study rooms and a few designated floors for quiet study, but the uncontrollable factor is that the library is subject to use by all disciplines which inhibits place

making. Disciplinary buildings can narrow entry to their majors after hours. This ability allows for the creation of personal space and tailor of a space to the students' needs without competing with the whole campus. This notion was further substantiated that they could leave out their design tools and study materials without repercussions of theft, a constant reminder through signage in the library not to leave your items unattended.

To further understand how students tailored study spaces, the photographic and contextual data pointed towards a strong preference in having their Study Materials & Accessories on hand. This included headphones to drown out noise, microwaves, refrigerators, coffee, water bottles with filtered water stations nearby, textbooks, and blankets. Many of these items are often taken to the library, but cannot be left behind. Although the library has some lockers, the ability to leave items near or in a studio classroom space is ideal for students with drawing tools, supplies, and books. The students also commented on Proximity to Amenities, which included the convenience to their classrooms, distance to travel between buildings, and distance to food. The library has a Starbucks that stays open until 12 am 5 days a week, closing at 5 pm on Friday and Saturday. The students commented on the desire to have more substantial food options available at night on campus in proximity to the Architecture buildings. The cafe that is situated inside the main Architecture building in Langford A closes daily at 5 pm, 3pm on Fridays, and is closed on the weekends. For students that spend so much time outside of their class schedule in their buildings, comments on their dissatisfaction with the limiting hours and proximity to food were noted.

Lastly, the students commented on Access to Help and Safety. Where do students access research help outside of the library? Many students create a multifaceted approach to resolve their questions. This included seeking help from professors, friends, teaching assistants (TAs), and administrative offices within their buildings. They frequently commented on their use of Google to answer questions with the information that they could find online. The interesting take-away from the interviews, was that the undergraduates often congregated in open lounges and seating areas to confer on assignments spontaneously if they saw a fellow student from class. This can be attributed to the location being exclusively set in their disciplinary building and the probability of them running into classmates more frequently than the library. The other element that weighed heavily on students was their sense of safety with the ability to swipe into the Architecture buildings after hours and on the weekends. They had a feeling of being secured, especially on weekends with football games or events preventing visitors inside while casually touring the campus. The main Architecture building, Langford A, has a modern brutalist appearance, which due to the resemblance of a large concrete "bunker," made the students feel safe from potential active shooters or inclement weather. The library is often referred to as a safe space for many students on campus. With these findings, the researchers can verify that safety and security are important to utilizing a space, especially when the faculty and staff are not on campus.

The photos were useful in validating the students' study experiences and gave context to the comments and interviews. An image is worth a thousand words is an understatement for this study. Post occupancy surveys are typically forms that people fill out to understand building usage. Sometimes researchers are left wondering, "What did they mean?" The photos clarify and

reduce frustration for the researchers, providing a visual depiction through the students' eyes. The images not only provided visual data, but allowed the researchers a window into the students' world. Through this study, hidden spaces were discovered that were unbeknownst to the researchers, including creative use of computer labs, classrooms, and studio spaces for napping, relaxation, or eating. The researchers found that the Architecture students tend to study more frequently in their buildings due to the nature of their discipline, 24/7 access, and using dedicated lounges, labs, and studios.

The strength of the libraries is that they provide a neutral place to meet, collaborate, and study. The need for students to place make will need to be acknowledged and addressed in the context of libraries. At most, students are allowed to move certain furniture in the same vicinity. It is unknown if the libraries would welcome something like hammocks in the library.

Future Research and Dissemination

The researchers currently have 70% of the study participation from the College of Education and Human Development. The early data from the College of Education and Human Development shows some similar preferences for technology and furniture arrangement. Another key difference seen from early data collection is the disparity between ample dedicated study spaces, such as student lounges or available unoccupied classroom use. For example, these students perceive they cannot use a classroom when not in session.

Theories:

- Due to the nature of their studies and educational programs, the assumption is that the type of image responses will be different from participants majoring in degrees in Architecture.
- We believe Education students do not stay in their spaces for as long as Architecture students, specifically overnight.

The College of Engineering and the Mays Business School were added to the research study when the Library Dean gave additional funding in the fall semester of 2019. Both colleges will be enrolled in the study in spring 2020. The College of Engineering is one of the largest colleges on the College Station campus. The College of Engineering's main building, Zachry Engineering Education Complex, underwent extensive renovation with the building's re-opening in fall 2018. The researchers are interested to see how the students use and if they prefer the new classrooms and technology. We have increased the targeted study participation from 30 to 50 students for the College of Engineering since the college is very large. The Mays Business School targeted student participation is 30 students in the study.

After all four colleges participate in the study, the photo and the gps coordinates will be placed in the University's institutional repository or the Texas Digital Library. All personal identifying information will be scrubbed prior to upload. This collection will be useful to researchers doing historical research, space studies, etc. The researchers plan to share the highlights of the College level findings with each college and the Libraries' administrators.

Conclusion

Ethnographic research of college study space does not normally address departmental spaces. Library literature often investigates study space usage within the library setting. This study adds to the literature on where students are studying and how they are using resources outside of the library. We believe this research can be utilized to compare library study spaces and departmental study space usage. The libraries can survey their student populations to create meaningful study spaces, which will ensure that the physical spaces of the library do not become obsolete [9]. According to Ellis and Goodyear [31], researching what students are doing and recognizing that students' learning activities often involve working with ideas across multiple spaces, can contribute to a more holistic understanding of continuous campus learning space.

The researchers believe this study will add to a robust body of research for future use. Further, the study adds to the body of limited research on qualitative ethnographic data focusing on departmental spaces and details the process for other researchers to explore.

Acknowledgment

The authors wish to gratefully acknowledge T3 grant for funding this research. The authors would also like to thank Babette Perkins for designing the photo tutorial.

References

- [1] K. E. Matthews, V. Andrews and P. Adams, "Social learning spaces and student engagement," *Higher Education Research & Development*, vol.30, no.2, pp.105-120, 2011.
- [2] J. Hunter, and A. Cox, "Learning over tea! Studying in informal learning spaces," *New Library World*, vol.115. no.1/2, pp.34-50, 2014.
- [3] D. Harrop and B. Turpin, "A study exploring learners' informal learning space behaviors, attitudes, and preferences," *New Review of Academic Librarianship*, vol.19, no.1, pp.58-77. 2013
- [4] G. Matthews and G. Walton, "Strategic development of university library space: Widening the influence," *New Library World*, vol.115, no.5/6, pp.237-249, 2014.
- [5] M.D. Riddle and K. Souter, "Designing informal learning spaces using student perspectives," *Journal of Learning Spaces*, vol.1, no.2, 2012. [Online]. Available: <https://eric.ed.gov/?id=EJ1152692>. [Accessed Feb.2, 2020].

- [6] D.J. Mallon III, "Making their place: Identifying the transformation of college space to student place, a study of individual student placemaking," *Ph.D. dissertation*, Indiana University, Greensboro, NC, 2015.
- [7] J.K Gray, M. Burel, M. Graser, and K. Gallacci, "Applying spatial literacy to transform library space: a selected literature review," *Reference Services Review*, vol.46, no.2, pp.303-316, 2018.
- [8] C.M. Block, "Spatial realism through the lens of cinematic history: A framework for space evaluation in academic libraries," *Space and Culture*, April 21, 2018, [Online]. Available: <https://doi.org/10.1177/1206331218770968> [Accessed Feb.2, 2020].
- [9] S.K. Rood, "Understanding Student Perceptions of Arizona State University's Downtown Campus Built and Social Environments and their Perceived Impact on Student's Wellbeing," Masters thesis, Arizona State University, Phoenix, AZ, April 2019.
- [10] S. Holder, and J. Lange, "Looking and listening: A mixed-methods study of space use and user satisfaction," *Evidence Based Library and Information Practice*, vol.9, no.3, pp.4-27, 2014.
- [11] Y. Lee, E. Young, T.H. Lee, and L. Velez, "Planning library spaces and services for millennials: An evidence-based approach," *Library Management*, vol.34, no.6/7, pp. 498-511, Aug.9, 2013.
- [12] J. Briden, "'Photo surveys: Eliciting more than you knew to ask for," in *Studying Students: The Undergraduate Research Project at the University of Rochester*, Editors, N. F. Foster, and S.L. Gibbons, Association of College & Research Libraries, 2007. [Online]. Available: www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/booksanddigitalresources/digital/Foster-Gibbons_cmpd.pdf
- [13] E. Altimare, and D.M. Sheridan, "The Role of Nonclassroom spaces in living-learning communities," *Journal of Learning Spaces*, vol.5, no.2, pp.1-14, 2016.
- [14] A. M. Cox, "Students' experience of university space: An exploratory study," *International Journal of Teaching and Learning in Higher Education*, vol.23, no.2, pp.197-207, 2011.
- [15] J. Blackmore, D. Bateman, J. Loughlin, J. O'Mara, and G. Aranda, *Research into the Connection Between Built Learning Spaces and Student Outcomes*, paper no.22, June 2011. [Online]. Available: <http://dro.deakin.edu.au/eserv/DU:30036968/blackmore-researchinto-2011.pdf> [Accessed Feb.2, 2020].

- [16] S. Lavy, E. Daneshpour, and K. Choi, 2019, "Higher education space management through user-centric data analytics", *Facilities*, vol.38, no.3/4, pp.346-364, 2019.
- [17] M. Bilandzic and M. Foth, "Learning beyond books—strategies for ambient media to improve libraries and collaboration spaces as interfaces for social learning," *Multimedia Tools and Applications*, vol.71, no.1, pp.77-95, 2014
- [18] A. Thomas, "Student photo diaries," Presentation at *Special Libraries Association Texas Chapter Meeting*, Austin, TX, 2017.
- [19] Texas A&M University. "Enrollment Profile Fall 2019."
<http://dars.tamu.edu/Student/Enrollment-Profile> (accessed January 19, 2020).
- [20] Texas A&M University. "College of Architecture Directory."
<http://directory.arch.tamu.edu/> (accessed January 20, 2020).
- [21] B. G. Glaser and A. L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York: Aldine de Gruyter, 1999.
- [22] A.L. Strauss, *Qualitative Analysis for Social Sciences*. Cambridge, MA: Cambridge University Press, 1987.
- [23] J. Corbin and A. Strauss, *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 4th ed. Sage Publications, 2015.
- [24] K. Charmaz, *Constructing Grounded Theory*, Sage Publications, 2014.
- [25] K.T. Konecki, "Visual grounded theory: A methodological outline and examples from empirical work," *Revija za sociologiju*, vol.41, no.2, 2011. [Online]. Available: doi: 10.5613/rzs.41.2.1. [Accessed Feb.2, 2020].
- [26] T. Budzise-Weaver, "Developing a Qualitative Coding Analysis of Visual Artwork for Humanities Research," *Digital Humanities Quarterly*, vol. 10, no. 4, pp. 1-14, 2016. [Online]. Available: <http://www.digitalhumanities.org/dhq/vol/10/4/000275/000275.html>
- [27] M.C. Groen, D. Simmons, and L.D. McNair, "An Introduction to grounded theory: Choosing and implementing an emergent method. In *ASEE Annual Conference and Exposition 2018, Columbus, OH, USA*. [Online]. Available: <https://peer.asee.org/27582>. [Accessed Feb.2, 2020].
- [28] L.M. Given, *The SAGE Encyclopedia of Qualitative Research Methods*, vols. 1-2. Thousand Oaks, CA: SAGE Publications, Inc. 2018. [E-book] Available: Sage Knowledge e-book.
- [29] I. Dey, *Grounding Grounded Theory: Guidelines for Qualitative Inquiry*. San Diego, CA: Academic Press, 1999
- [30] S. Friese, *Qualitative Data Analysis with ATLAS.ti*. Sage Publications, 2014.

- [31] R. A. Ellis and P. Goodyear, "Models of learning space: integrating research on space, place and learning in higher education," *Review of Education*, vol.4, no.2, pp.149-191, 2016.