Design for Success: Can Place Attachment and Cognitive Architecture Theories Be Used to Develop Library Space Designs that Support Student Success?

Sam Wallin and Karen R. Diller*

In order to design spaces to best support patron needs, academic librarians need to have a more comprehensive understanding of not only the practical needs of patrons but also of the conscious and unconscious needs that must be met by spaces if they are to support patron goals. Since the Society for College and University Planning’s (SCUP) 2013 report which stated “we do not yet have a body of data on the design of learning spaces that can guide those who must make decisions about the design, construction, and deployment of…libraries…,” academic librarians have been refocusing their energies on the assessment of library spaces to inform design. However, too many pre-design space assessments emphasize the functionality of specific spaces in the library, underestimating the importance of psychological concepts elucidated in place attachment (PA) and affordance theories and research. Placing space assessment into a wider context of psychological theory can help the field better understand how and why patrons interact with space, thereby aiding in the design of spaces that are truly conducive to academic study.

Place Attachment (PA) and Affordance

Place attachment “refers to the emotional bonds between an individual and a geographic locale, or how strongly a person is connected to a place” and is frequently associated with place meaning which is “the descriptive, symbolic meaning that people ascribe to a place.” People develop attachments to places for a variety of reasons including security, goal support, and to provide temporal and personal continuity. PA has been used most often to examine factors associated with pro-environmental behavior, response to disasters, geographical displacement and community space design. Recent dissertations demonstrate that “the connection between place and people is not a topic being addressed in the higher education literature” and the connection between a sense of place and college students is only being examined as part of larger conversations on student retention. Nor is PA being used “in secondary school settings as a way to determine how adolescents perceive their educational environments and how this might be related to how they perform academically.” While “library as place” has been discussed in the academic library literature, PA theory as the basis for research on study space has not.

Although not commonly found in the literatures of higher education and library science, PA and its related concepts has been the focus of much research, especially in environmental psychology, and thus, many definitions can be found in the literature. For this research, Scannell’s and Gifford's 2010 “Tripartite Organizing

* Sam Wallin, Data Analyst and Projects Coordinator, Fort Vancouver Regional Library District, swallin@fvrl.org. Karen R. Diller, Library Director, Washington State University Vancouver, diller@wsu.edu
Framework” for PA will be used (see Fig. 1) because it aims to bring together much of the conceptual work done in the research to 2010. “This framework proposes that PA is a multidimensional concept with person, psychological process, and place dimensions.” A brief discussion of these three dimensions will serve as the backdrop to the current research. The person dimension takes into account who the individual is and what groups they identify with. This dimension considers such things as how a space may take on meaning based on a person’s past experiences or religious beliefs and how a meaning may be shared by members of the same group (group identity as defined by the individual). The psychological process dimension takes into account such considerations as the bond that is created between a person and a place because that place satisfies a need or provides a feeling of well-being, the schemas that individuals build cognitively that help them identify (label) a place and draw similarities between themselves and a particular type of place, and the actions that people take to maintain their closeness to places of meaning. The final dimension, place, examines the role of the place as object of the attachment. It considers the characteristics of the place and how those physical characteristics can support goals and it also considers how a place can “facilitate social relationships and group identity.”

More recently Raymond, Kytta & Stedman have proposed that most PA research has focused on “the steady, ‘slow’ development of strong attachments and stable meanings” at the expense of considering “how direct and immediate perception-action processes presented in affordance theory (resulting in immediately perceived place meanings) can complement” slower forms of PA. Affordance theory looks at how the specifics of the environment like objects, surfaces, furnishings, and other creatures can allow a person to immediately form a meaning for the place and see the possibility for action within that space. And that each person, because of their individual traits, social history, etc., may apply a different meaning to a space and may want to perform different actions within the same space. Raymond et al. note that these meanings and perceived actions develop immediately even while the slower processes associated with PA are developing.

FIGURE 1
The Tripartite Model of Place Attachment*

Taken together, PA and affordance theories provide lenses with which to examine aspects of both immediate and slower to develop attachments that students may make to study space, particularly those in the academic library. After considering both the research on PA and affordance, the researchers decided to rely on both in the development of this research.

Cognitive Science

Before addressing how concepts from cognitive science are important to the theoretical basis of this research, some more details from PA are important to consider. From research reviewed by Gifford and Scannell in their development of the Tripartite Organizational Framework, the following aspects, important to study spaces, of PA are discussed:\textsuperscript{12}

- People become attached to places that provide them with a sense of security and comfort and that, in some cases, provide the resources for their survival.
- People will repeatedly use spaces that they perceive to support and facilitate the attainment of their goals. These spaces allow them to better regulate their emotions and self-control so that they remain focused on goal attainment.
- Spaces with restorative qualities (spaces that decrease cognitive load and allow for recovery from mental fatigue) are “conducive to self-reflection, problem-solving, and stress release.”\textsuperscript{13}
- Attachments are likely to form to places that facilitate “social relationships and group identity” which are compatible with personal identities and goals.\textsuperscript{14}
- Places that people become attached to help provide continuity. People identify with these places because they fit well with their sense of self, and thus, the place helps to reinforce a stable sense of self. Longer-term association with a place also provides temporal continuity, with a person connecting the present with memories from the past. Both types of continuity can bolster self-esteem.

These research results from PA connect directly to research from the cognitive sciences on what supports learning. This research, just like PA research, is voluminous so two sources of summaries on the research will be used to highlight important concepts.\textsuperscript{15}

- Directed attention is needed for learning. Human attention has a limited capacity, can only focus on a limited number of stimuli at one time, and becomes fatigued (mental fatigue) throughout the day from such things as stress, anxiety, feelings of insecurity, noise and unpleasant distractions.
- Any stimuli with emotional content will gain a person’s attention. This may intensify learning if on-topic or will distract from learning if it is unconnected to the learning activity.
- Avoiding attending to stimuli that detracts from the learning activity will improve learning. Distracting stimuli may be such things as noise, movement of people within an area, temperature, amount of light, and other issues of general comfort.\textsuperscript{16}
- Taking breaks between study sessions is beneficial to learning. And, having areas within the study environment that allow for brief mental breaks of “soft fascination” without becoming fully removed from the study mindset can be beneficial.\textsuperscript{17}
- While quiet spaces are conducive to some types of learning activities, there are real benefits to “practicing” content by talking it out with others. This can lead to more reflective thinking.
- Anxiety, attitude, motivation, concentration, self-testing, scheduling, study aids, information processing, selecting main ideas, and test strategies all play a role (positive or negative) in successful learning.
- Reflective thinking, effort, persistence and the structured and organized approach to studying have been found to lead to successful learning.
There are specific intersections between these highlights from PA and the cognitive sciences. For example, directed attention (cognitive) is improved in settings where people have security and comfort (PA). There are also general correlations. For example, PA is developed when a place supports a person’s goals and will encourage that person to spend more time in that place while cognitive theory notes that persistence and effort lead to successful learning. This research explores these intersections in order to determine if PA theory, combined with theories of study and learning habits could be used as a basis for library space design. It recognizes a need in libraries for data and theory that supports library facility design decisions that are relevant to student needs now and into the future. This paper, written after data collection but before analysis, is designed to discuss the theoretical basis of the research project along with a discussion of the methods used. Results will be shared at a later date.

Research Setting
Washington State University Vancouver (WSUV) is one campus, located in the Portland, OR metropolitan area, of the WSU system. As part of a R1 institution, it offers bachelor’s, master’s and doctorate degrees. WSUV is a commuter campus with approximately 3500 FTE, 43% of which are first-generation students. The average age of students is 26. The Library is the main study space on campus and provides computer workstations, group study rooms, and both active and quiet study spaces. It contains a small, focused print collection of books, media and journals along with a deep and rich selection of electronic journals and reference works. Because the Library’s physical spaces are used mostly by undergraduate students, this research focused on the undergraduate student population at WSUV.

Research Design
This research has been designed to investigate whether students develop an attachment to space, as defined by either PA or affordance theories and what features of study spaces, inside and outside of the library, may encourage or inhibit the development of PA. After extensive searching in the library science, environmental psychology and cognitive architecture literatures, the researchers decided to explore the following questions, applied to study spaces within or outside of the Library:

- Do students assign place meaning to study spaces?
- Do students develop PA to study spaces?
- What can we learn from using PA & affordance theories when analyzing student comments/input about the spaces they use to study that can help design better study spaces for students?

A mixed methods research design, drawing on both qualitative and quantitative data collection and analysis methods, was applied using six different methods, three formal and three informal. A mixed methods approach was chosen based on four of the five purposes for mixed method research, as defined by Greene et al., including triangulation, complementarity, initiation and expansion. Formal methods included the walking interview, photo elicitation, and focus groups. Informal methods included two methods to collect feedback on specific study spaces and “love letter” and “break up” letters written to specific spaces. All methods were designed with key concepts from PA and affordance theories and successful learning strategies in mind. Specific information about participants will be discussed with each method. However, it is important to note here the two overarching principles in participant selection were:

- library and non-library users
- library and non-library spaces
Methods

What follows are brief explanations of each method used along with a discussion of the research questions and their connection to PA and affordance theories.

Walking Interview (a.k.a. Go-along interview)

Undergraduate students, frequent and in-frequent library users, were recruited using various means both inside and outside of the Library. A screening survey allowed researchers to look for wide representation based on age, gender, major, and frequency of library use. This particular method is conducive to those who have been library users. Researchers also recognize that it may preference students who are sighted and easily mobile.

In reviewing the variety of methods for obtaining information about people's experience within a space, the 'walking interview' or 'go along interview' method stood out. In this method, the interviewer and participant explore a known space together while the interviewer asks questions related to the participant's use of and navigation through the space. In past studies on PA, participants walked through neighborhoods, farms, and university campuses. While interviews about spaces, mapping exercises, and observational studies have been applied to space use within the library science field, the walking interview does not appear to have been used in any published studies.

This type of interview has some advantages over the others in that the interviewer can be assured of the exact spaces that the participant is talking about, the participant does not have to rely on their memory to describe important features, and the interviewer and participant can experience the place while discussing it. In this study, the participants were also equipped with a head-mounted GoPro camera, and thus, the researchers could see exactly what the participant were looking at while talking. A walking route was selected that started at one of the common entry points to the campus, led across campus to the library, and allowed the student being interviewed to then lead the interviewer on a tour around the library.

The questions asked during the walking interview were drawn from a variety of sources on PA, or were designed by the authors of this study to help connect the concepts more directly to library and study spaces. For example, PA literature supports the idea that people develop attachment to spaces over time, and the strength of their attachment can be influenced by repeated interactions with the space. Therefore interviewees, all of whom indicated that they currently were frequent library users, were asked to recall their earliest memories of using the library as a means of establishing a length of time spent interacting with the library. Other questions were designed in such ways to address both PA and affordance concepts. For example, once inside the library the interviewer and interviewee took a moment to look around the library from the entrance area. “When you look around the library, what do you see that reflects who you are?” This question not only allows for the possibility of addressing PA theory, such as pursuit of goals but also of addressing affordance by seeing if the participant sees the possibility of action in this space because of the objects, etc. that are visible.

In another question, the interviewee was asked to take the interviewer on a tour of the library, pointing out places they had used. The goal of this question was to use the visual cues of the space itself to aid the interviewee's recall of their experiences in the space, and to provide more nuanced responses. The tour of the library was the main part of the interview where the walking interview format was most important, in that the student took the lead and showed the interviewer the library from their perspective and revealed their use patterns. In addition to providing a method that supports participant recall of the space being discussed, the tour also revealed what spaces are used or important to frequent library users. In a study of Parisian university students’ development of PA through place appropriation behaviors, Rioux, et al. show a correlation between three place appropriation behaviors and PA. These three behaviors are: “exploration through route variety, exploration via diversity of destinations, and knowledge of landmarks.”
Finally, interviewees were asked to take the perspective of someone designing or redesigning the library. What would they keep, and what would they remove? Not only did these questions allow the Library Director to gather very direct information that could be helpful in a space redesign, they also allowed for an understanding of what features were critical, or not, to the participant's assigned meaning of the space, connecting them to affordance theory.

Overall the walking interview method was time-intensive but yielded large quantities of nuanced data. In addition to providing students the ability to point out, go to, or even touch the things or places they were talking about, students were also reminded of things that may not have otherwise come to mind, or been easily understood by the interviewer in a more traditional interview setting. For example, when asked what they would keep or change in the library, several interviewees mentioned the books as being something they would keep, even though they had not pointed out use of the books during the entire interview to that point.

There were some drawbacks to the use of this method. As mentioned before, it is a method that preferences both regular library users and those who are comfortable with the mobility demanded from the method. While the use of the head-mounted GoPro camera was mostly beneficial, it was not comfortable for all participants and its operation in the correct mode (video rather than second-by-second photo images) was difficult to determine at times. Finally, the main drawback was time. It was very time-intensive to arrange appointments and to gather data on an individual basis.

Photo Elicitation and Focus Group

Undergraduate students, library and non-library users, were recruited using various means both inside and outside of the Library. A screening survey allowed researchers to look for wide representation based on age, gender, major, and frequency of library use and to target non- or in-frequent library users. This method was also selected as a way to encourage any participants with mobility impairments.

There were two distinct activities in the focus group. The first activity required students to take pictures of up to five locations they used as study spaces. Three copies of each photo were printed for the focus group, and students were asked to rank their five spaces in order of preference for each of three different phrases:

- I would be most productive here.
- I would stay longer in or return more often to this place.
- This space is closest to my ideal study space.

These statements were adapted from an instrument used in one of the author's previous research projects and are associated with the development of PA and good study habits. During the analysis phase, the association of these statements with photographs may also allow for some associations with affordance theory. Finally, these statements are the same statements as were used in the 3 Phrases/8 Pictures exercise which may allow for easier mixed method analysis.

Following the photo exercise, the focus group began. The facilitator explained the rules of focus group participation and was sure to allow time for all participants to speak. Three main, open-ended questions were designed but the facilitator used follow-up questions to elicit more details and/or encourage more students to participate in the discussion. Once again, these questions were designed with PA and affordance theories in mind. Knowing that students seek out study spaces for both individual and group study, questions were asked about both, especially since group identity is part of both theories. The third question returned to two common PA themes—spaces that support goals, and spaces people want to spend time in. The three questions were:

- Tell us about a recent experience you had studying alone. Describe the space you were in. What was helpful about the space. Not helpful about the space?
• Tell us about a recent experience you had working in a group for coursework. Describe the space you were in. What was helpful about the space. Not helpful about the space?
• If you were designing the perfect study space—one that you would want to use often and could be most productive in—what would be the essential features?

The combination of photo elicitation and focus group methods resulted in rich discussions that will yield valuable information. However, both methods created difficulties. While participants were asked to submit their photos (with choice on methods of submission) at least one hour before their focus group session, most did not and so it became a logistical nightmare to get photos downloaded and printed (3 copies each) in a timely fashion. In addition, it was very difficult to find a timeslot that would work for more than two to three participants at a time and the percentage of no-shows was high. Interestingly, while the students invited to participate were fairly evenly divided between genders, females made up the majority of actual participants. Researchers also wonder if having the photo elicitation exercise right before the focus group influenced the content of the replies during the focus group. The focus groups did result in much data that is on-topic and the interaction between participants during the focus groups, at first glance, seems to be informative. Some additional training for facilitator and notetaker on how to interrupt to identify speakers and/or clear-up confusion on which spaces participants were commenting on would have been helpful.

3 Phrases/8 Pictures
This method allowed the researchers to take advantage of an opportunity to interact with many students in a short period of time. Before the start of classes each Fall, the campus hosts a fair where many campus services, clubs, and departments set up tables, hand out prizes, and try to attract students. It is a very active, positive, fun, outdoor atmosphere. The library has had a table at the fair every year, and usually has something interactive for students to do. For this year, a large display of eight photographs, depicting different styles of study areas, was set up beside the Library’s table. The eight photos displayed traditional library and non-library settings and architectural styles that were both traditional and modern. Each student was given three slips of paper, each with a different phrase (the same phrases as used for the Photo Elicitation exercise):

• I would be most productive here.
• I would stay longer in or return more often to this place.
• This space is closest to my ideal study space.

Students were asked to place each phrase in an envelope below the image that created the closest match. No demographic data was collected. The goal was to gather a lot of anonymous data from local students about what they were looking for in productive spaces, comfortable spaces, and spaces that have as many right elements as possible. Because the statements used were the same as used with the photo exercise where students had photos of their actual study spaces, the researchers hope to gain greater insights about the elements that contribute to productive and ideal study spaces.

The value of this style of data gathering lies in the large amount of data that can be gathered quickly. It can be used to compare against data gathered through other methods to determine if any significant differences arise across methodologies. While the data gathered in this manner is not suitable for some types of data analysis or conclusions associated with demographic data, it is a large enough data set to allow for simple statistical analyses and will be useful as a supplement to other data gathered. A side value of this method was the opportunity for library faculty and staff to interact in a very positive way with a large number of students. Students found the exercise to be fun and more often than not took the time to have a meaningful conversation with library employees. Oddly enough, the most difficult part of this method was to find appropriate pictures. If used in the future, these researchers will allow time to visit various library/non-library spaces and take their own pictures.
Love Letter / Break-up Letter
Participation in this exercise was sought by placing signs, collection boxes, and blank paper on several tables throughout the Library. No demographic data was collected. Students were provided with some “stationery” to write to the Library, saying what they loved or why they would want to end their relationship with the exact space they were currently sitting in. This method was found in and adapted from the literature for the participatory design of websites. This method has been used successfully as part of focus groups to assess websites but here it was employed as an opt-in method for students in the library. The opt-in choice proved to be a mistake. Researchers assumed that students would take some pleasure in using creative writing styles to express what they liked or disliked about library spaces. However, after several weeks of displaying the request for letters in prominent areas of the library, only five students had written letters of any kind, and of those, only one appeared to fulfill what was requested. Although the activity did not yield any usable data for the project, the lack of student input may have had less to do with the activity itself, and more to do with student reluctance to undertake what may be a task of several minutes without some direction or encouragement from others. In addition, this method may be less attractive to the WSUV student body, being made up of older, commuting students, than it is to more traditionally-aged, residential college students. The activity could be employed at a future time in a focus group setting and may yield good information for a space redesign.

5 Adjectives
Participation was sought by creating displays on two movable whiteboards and situating them at various places throughout the Library. No demographic data was collected. In this method, a display was set up in the library showing the same eight images of study spaces as were used in the 3 Phrases / 8 Pictures method above. Students were prompted to make a list of five adjectives for any of the images of their choice. The level of participation was low, but students did provide more contributions to it than to the Love Letter / Break-up Letter method. The goal with this data gathering method was to balance out the 3 Phrases / 8 Pictures method with a means for students to choose their own words to describe certain spaces. When limited to only three phrases, students may indicate an image as being the closest match to a phrase while feeling that none of the images are a particularly good match. With this method, students could choose their own words to describe the images and did so. Data gathered will be considered in light of the other methods used but no conclusions based solely on this data will be made due to the small number of participants.

Conclusion
Academic librarians are actively involved in redesigning library spaces to meet the needs of their users. Research to understand how to meet these needs is developing at a rapid pace with much emphasis on how current areas are being used, where students go and what they do there, and the functionality of spaces. The focus of the research being reported here was designed to look beyond the library science field for a theoretical basis to space research that might uncover other reasons that spaces are found to be useful (leading to successful study) or not to undergraduate students. Researchers were also interested in looking for a multiple method design that would combine more commonly used methods with new (to academic libraries) methods of research.

PA and affordance theories, when combined with research from the cognitive sciences, provided a good theoretical lens for this research and made it easier to focus the development of all methods on several key issues that were found at the intersections of these theories and research. Researchers found that becoming more familiar with theory from psychology, cognitive architecture and education gave them a broader look at issues that impact peoples’ reactions to and use of spaces.
A mixed methods approach enabled the researchers to not only explore potential relationships between PA and student study space needs but also to gather very practical information useful to the library's leadership. In addition, it provided a vehicle to experiment with new (to the researchers) methods that may be useful in the future. While data analysis is just beginning, the researchers have already seen some of the advantages to mixed methods research such as corroboration of results, ways to clarify data, and contradictions to be explored. In this case, having multiple methods allowed for rich data to be collected despite the fact that two of the methods were unsuccessful due to low participation rates. The extremely high participation rate for one of the informal methods (3 Phrases/8 Pictures) will provide some quantitative data to augment the rich, qualitative data gathered from both the walking interviews and focus groups. Researchers hypothesize that the success or failure of each method may be due more to situational factors than to the viability of the method itself. As a commuter campus, with no student housing, and a campus serving a majority of non-traditional (average student age is 26) students, fun, opt-in methods of engagement, particularly ones that take time (Love Letters) may not have appealed to students while they were visiting the library on very tight schedules. The two main disadvantages to the mixed, and multiple, methods are obvious ones. First is the amount of time needed to coordinate, schedule and conduct the research and the amount of time to transcribe and work through all of the data. Secondly, because the methods drew from both qualitative and quantitative approaches, it will be challenging to put the results into an accurate and coherent picture.

In conclusion the researchers found the value of working outside the Library and outside of the library science discipline to develop and conduct research. Using applicable theory and method from other disciplines has provided another lens through which to view study space needs of undergraduate students. And, using a presence at a big, fun, campus event to gather data not only provided a very large participant pool but also created a very positive way for librarians to interact with a very large and diverse portion of the student body. Discussion of the results of this research will be published soon after this presentation.

Notes
8. Ibid., 4.
10. Ibid., 1.
11. Ibid., 2.
13. Ibid., 6.