Design Guidelines for Activating Outdoor Spaces of University Campuses

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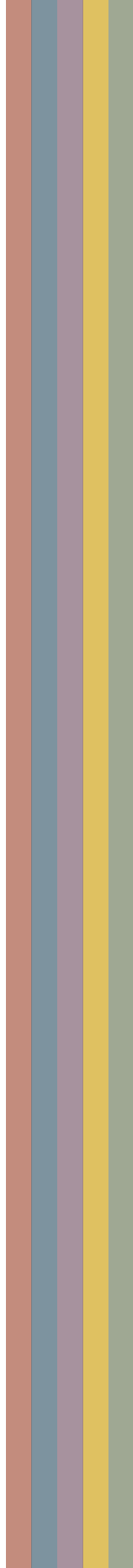Senior Project Advisor

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS

1.0
EXECUTIVE SUMMARY

Campus design is a topic that caught my fascination after taking urban design studios as part of Cal Poly's City and Regional Planning program. Campus design is a fluid subject that never has a correct answer. Hundreds of years of influence has gone into guiding foundational principles of urban design, but the illusive topic of effective outdoor campus design for secondary educational institutions simply does not have enough relevant studies covered in modern architecture or planning.

Taking time and consideration towards planning for a college campus is essential when wanting to facilitate students success, both socially and academically. As a student, I have experienced both effective and ineffective campus design, and it is in those moments of experiencing successful campus design that I feel inspired to work harder, to improve myself, and to improve the design of the world around me.

This study has served in part to identify how to design an outdoor space to be supportive of both learning and socializing, in effort to understand how the planning and building of a campus can contribute to student success. Student success in outdoor spaces can be facilitated through diverse design considerations taking into account the types of activities a student engages in on any given day.

Through behavior setting, use of various design attributes, and consideration for types of activities, campus planners and designers can understand how to manipulate a space to influence certain behaviors that contribute to both academic and social success. It is my hope that this report provides an introductory analysis on how to effectively execute these complex, yet ever so important concepts.

2.0
LITERATURE REVIEW

Often in planning for an educational institution, whether it be a small scale elementary school or a large university, the idea of the outdoors remains distinctly separated from the classroom. Outdoor spaces on campuses are largely designed for recess and play, while indoor spaces are planned for focus and learning. Recess is centralized around children laughing, college students napping, or for the catching up of friends. These spaces are fundamentally separated from the classroom— the indoors being a space for learning, and the outdoors being a break from the learning. However, new studies encourage the use of outdoor spaces as learning environments which can be just as, if not more, successful than indoor learning spaces.

A shift in modern planning of educational institutions is beginning to emerge, wherein the utilization of outdoor space is gaining momentum. Classrooms are beginning to bleed out into the natural spaces around them, effectively bringing the classroom outdoors, forming a holistic learning experience. School gardens, outdoor amphitheatres, and places to display work are beginning to fill outdoor spaces, expanding the classroom to constitute outdoor space in addition to indoor. A revolution on the definition of the classroom, and the implementation of new teaching techniques are in their beginning stages of development, and are quickly gaining momentum in modern planning and architecture.

There are two main reasons universities should be prioritizing outdoor spaces on their campuses: for first impressions, and for fostering a holistic learning environment. First and foremost, the physical environment is one of many essential influences that attract prospective students to a university. However, these spaces cannot be designed simply for show. These spaces must go beyond the artificial, and need to be a tool a the disposal of the students themselves. Well- planned educational environments are credited with being a main driver of student success, and therefore, "institutions themselves bear responsibility for the design and creation of campus environments, arranged appropriately for meeting educational purposes"[1] . Outdoor environments are just as important to student success as are physical spaces such as a library, cafeteria, or university square. Two primary types of outdoor spaces: learning and social, comprise the basic needs of students and faculty on university campuses. The need for progressive outdoor learning and social gathering spaces is becoming increasingly clear, and the responsibility lies on the university and its faculty to create them.

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1   Strange, C. C., & Banning, J. H. (2001). Educating by design: Creating campus learning environments that work. San Francisco: Jossey-Bass.

2.1 Learning Spaces

Although creating beautiful outdoor spaces is essential in gaining attraction from prospective students, the overall function of outdoor spaces should be to contribute to *current* student success. Both these goals can be met through the examination and careful consideration for both learning and social outdoor environments on campus'. Educators at universities around the world should be utilizing diverse environments to foster educational success, using innovative techniques that present themselves as time moves forward. Banning and Strange argue that using alternative learning environments, such as the outdoors, helps students learn to adapt in their environment much like they would in any nonacademic setting. Educators and students can utilize sophisticated human environments to create "features that will challenge students toward active learning, growth, and development" [1]. Additionally, the physical design of a space is what ultimately creates a successful learning environment, success being defined as spaces that: 1) have features within the physical environment that encourage learning and development; and 2) features that promote the acquisition of skills that in turn foster learning and development[2]. The slow embrace of outdoor learning environments is revolutionizing the ways in which students are expected to learn, and teachers are expected to teach. A new relationship between nature and the conventional classroom is paving the way for a fundamental shift in education: the concept of learning in informal environments designed specifically for promoting student success.

Conventional learning spaces are those that are indoors. Traditional indoor classrooms are often comprised of a wall mounted chalk or white board, and individual desks, set orderly in front facing rows. The educator speaks in the front of the room in a formal presentation to students. A shift in classroom dynamics has admitteldy been in the works since the beginning of the 21st Century[3]. Classrooms for younger students and some universities are beginning to incorporate flexible furniture to allow for rearranging of seats to promote creation of collaborative spaces. Goertz argues that starting collabortive environments at a young age can help prepare students for college and for a career, because there is a difference "between conversing with others and true collaboration"[4], true collaboration being a skill built over time through working with others intimately. Yet these spaces fall flat in the transition from one institution to another, if the second institution doesn't use any of the same techniques to encourage student collaboration. Elementary, middle, and high schools that utilize collaborative work enviroments can accurately prepare students for collaboration in their lives, but those skills can be discouraged in the

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1 *Banning and Strange, page 2.*
2 *Banning and Strange, page 31.*
3 *Goerts, P. (15, November 4). What Does a 21st Century Classroom Look Like: Collaboration. Retrieved November 25, 2017, from https://www.edutopia.org/discussion/what-does-21st-century-classroom-look-collaboration*
4 *Goerts, page 1.*

still conventional university learning environment once they have moved on to higher education. Universities are finding themselves playing catch up with their growing student populations, building the occasional new facility with progressive design principles, yet leaving no funding for updating outdated conventional spaces that presently don't foster collaboration. Students who come from highly flexible learning institutions are then forced back into repressive environments where collaborative skills are potentially lost.

In addition to informal environments for learning, informal environments for studying can also be effective tools in retaining information. According to USA Today College, there are two primary ways in which outdoor studying can benefit the average college student. One benefit is that being outdoors for recreational and academic purposes can reduce stress, increase concentration, and promote a healthy and active lifestyle[5]. These benefits gained while studying can in turn translate into other aspects of student life, encouraging the use of outdoor spaces, and in turn promoting understanding of the benefits these informal spaces have to offer.

The second argument in favor of outdoor learning environments is that they can ease financial and administrative strain on University officials[6]. There are three main reasons why outdoor learning environments are becoming increasingly popular. The first reason being sustainability. A society placing extreme importance upon building sustainable, incorporating energy efficient lighting, water fixtures, and materials, means constructing outdoor environments will be less impactful than constructing new structures to house classrooms. The second reason in favor of outdoor learning environments is financing, because "facilities have become so expensive to build that, if there's ever an opportunity to create an outdoor venue, administrators are more onboard with it than they were 10 to 15 years ago"[7]. A third reason for outdoor learning environments gaining in popularity is that they enhance campus aesthetic and increase initial attraction to a university by prospective students.

The literature supporting the need for outdoor learning environments is plentiful as the shift towards these alternative forms of learning are being tested more fluidly. Most of the research already conducted focuses on the benefits of outdoor learning, making a case for why they should be implemented. However, there are fewer reports on how to implement this new wave of learning environments, and how to ensure success. One such piece of research is presented in *Educating by Design: Creating Campus Learning Environments That Work*[8]. This work incorporates all known psychological and architectural works relevant to planning for outdoor

5   Tutors, Varsity. "Why you should be studying outside." USA Today, Gannett Satellite Information Network, 19 Apr. 2016, college.usatoday.com/2016/04/19/why-you-should-be-studying-outside/.
6   Kollie, Ellen. "How to Design Outdoor Learning Environments." College Planning & Management, 1 Jan. 2015, webcpm.com/Articles/2015/01/01/Outdoor-Learning-Environments.aspx?Page=2.
7   Kollie, 2015.
8   Banning and Strange, 2001.

learning environments, and makes a case for why these spaces should be utilized, and how to do so effectively. Three fundamental elements of outdoor learning environments were established in this work, and discussed within the context of student success, to be discussed throughout this review.

The 'Hierarchy of Learning Environment Purposes,'[9] outlines three tiers by which outdoor learning spaces can be successful. Each tier is a component of learning that is essential in the implementation of successful learning environments within any context, and are basic characteristics that outdoor environments shall implement to ensure success. These tiers, in ranked order are as follows:[10]

- Tier 1: Safety and Inclusion
- Tier 2: Involvement
- Tier 3: Community

2.1.1 Tier 1: Safety and Inclusion

The safety and inclusion tier of outdoor space is at the basis of all outdoor spaces in the public realm. This tier builds upon the "sense of security and belonging,"[11] which can be broken down into the two sub-categories of the tier itself: *safety and inclusion.*

Safety in public spaces, particularly those meant for educational purposes are necessary for a user to feel comfortable being in and interacting with a space. A sense of safety within a place will not only increase the chances someone will be attracted to and effectively utilize a space, but the overallperception of safety reinforces a 'feel good' response in users that will inevitabely associate positive emotions within a space[12]. However, in addition to physical safety within a public space, safety in the form of inclusion- a sense of belonging- is a key criterion for multicultural placemaking.

Multicultural placemaking is a planning and design concept that focuses on creating spaces that feel comfortable for all different demographics within an area. Public spaces have the power to unite people of many different cultural backgrounds together, and a sense of belonging within a space will encourage those with various cultural backgrounds to feel welcome within a space at the same time[13].

9   Banning and Strange, 109.
10   Banning and Strange, 109.
11   Banning and Strange, 109.
12   Cattel, V., Dines, N., Gesler, W., & Curtis, S. (2008). Mingling, observing, and lingering: Everyday public spaces and their implications for wel-being and social relations. Health & Place, 14(3), 544-561.
13   Knapp, C. (2013, December 06). Making Multicultural Places. Retrieved November 27, 2017, from https://www.pps.org/blog/multicultural_places/

As universities grow in diversity, such spaces are increasingly more imperative to student success because they provide spaces wherein the entirety of the student body feels welcome and accepted. Feeling welcome within a space results in advance knowledge of cultural groups, increased interactions with cultural sub-groups, and an appreciation of commonalities between students of different ethnic backgrounds[14]. Such spaces move beyond physical safety and create an entirely new sense of safety- an emotional safety- that allows for self expression and engagement, as is necessary in Tier 2: *Involvement.*

2.1.2 Tier 2: Involvement

Safety and inclusion are merely the beginning steps in creating successful learning environments. "Education is fundamentally about engaging students in a process that calls for risk taking and challenge"[15] and campus environments therefore must create environments that allow "effective learning experiences that require [students] taking on meaningful roles and responsibilities"[16]. A public educational space must move past simply attracting a student and ensuring they feel safe and welcome, it must also invoke a desire within the student to interact with the space, to participate in discussion and activity. In a study of fourteen educational institutions, determinations on the characteristics of such spaces were outlined as follows[17]:

-The institution that houses the space must have a mission to encourage student participation and involvement; [18]
-The overall experience of students must encourage active involvement; [19]
-Small, human- scale environments shall be utilized to increase student interaction with one another; [20]
-Educators shall encourage involvement; [21]
-And education must reinforce feelings of specialness and inclusivity. [22]

Each of these five elements are required, in part or in whole, to contribute to a space that successfully sparks the interests of students enough to get them expressing themselves and participating in group activity. Spaces that encourage participation and collaboration become facilitators of community, the basis of Tier 3.

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14   Knapp, 2013.
15   Banning and Strange, 2001.
16   Banning and Strange,101.
17   Kuh, G. D., Whitt, E. J., Schuh, J. H., Andreas, R. E., Lyong, J. W., Strange, C. C., Kerhbiel, L.E., & MacKay, K.A. (1991). Involving Colleges: Encountering student learning and personal development through out-of-class experiences. San Francisco: Jossey- Bass.
18   Kuh, et al., 341.
19   Kuh, et al., 345.
20   Kuh, et al., 351.
21   Kuh, et al., 359.
22   Kuh, et al., 360.

2.1.3 Tier 3: Community

In addition to safety, inclusivity and involvement, and the presence of community is essential to public educational spaces. In order for the complete potential of an outdoor educational space to be realized, there must be an "experience of full membership in the learning setting" which is key "in an environment that is characterized by the dimensions of community"[1]. The fundamental functions of a community are to offer commonalities within citizen groups. These groups offer security, a sense of being welcome, and encourage overall engagement from members of the community. However the characteristic of community important to foster a successful educational environment is "an environment offering [the community] opportunities to engage over time in a distinct history, tradition, and culture… qualities associated with community have … a common location, common ties of purpose and direction, and forms of social interdependence"[2]. Communal spaces are those that offer opportunity for self and cultural expression free from discrimination. Community spaces are more than a safe space for expression, they are locations wherein various cultures feel free to discuss ideas, provide feedback, and debate. Public learning spaces on a university campus can function as more than a conventional classroom can, and break beyond the vanilla interpretations of traditional learning. Universities are spaces wherein cultures are colliding, ideas are shared, and students are learning about the world around them. Educational spaces provide such a locale, where collaboration between students can produce community. Therefore, institutions wishing to construct outdoor, collaborative environments, must understand the community they will serve, and planning for environments that are sensitive to those communities, and that will facilitate the desired results. Kollie suggests five ways in which outdoor learning environments can be built to accommodate its community: [3]

1. Address programming needs: conduct enough public outreach to gather a comprehensive understanding of the needs of a student body, of faculty, and of staff;

2. Provide varying sun and shade spots: planning these locations to have a mix of sun and shade will ensure there is enough variety in space for everyone to find what they are looking for;

3. Provide seating flexibility: seating flexibility allows a space to transform into whatever a user needs it to be. Moving seating around can help transform a space from a quaint study spot to a large group educational setting in a matter of seconds;

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1   *Banning and Strange, 101.*
2   *Banning and Strange, 161.*
3   *Kollie, 2015.*

4. Consider eco-revelatory design: eco-revelatory designs facilitate a relationship between nature and people, ensuring a sense of place and familiarity, as well as enhancing learning opportunities;

5. Allow students to lead: allow a space to be flexible enough that it satisfies the evolving interests of its users. Ensure that a space can efficiently change over time to suit the needs of the body using the facility.

The overall sense of community fostered through well planned outdoor educational spaces nicely marries the needed characteristics of safety, inclusion, and involvement needed for successful places. The Hierarchy of Learning Environment Purposes[4] offers a thorough analysis of the elements needed for successful learning environments, yet the topic remains a subject requiring vast amounts of research and implementation to further solidify the needed characteristics of these spaces.

The National Academy of Sciences (NAS) in Washington D.C. is one of the leading institutes researching the ways in which outdoor learning can enhance the experience for both students and teachers, facilitating a more comprehensive learning environment for all, while also enhancing collaborative skills. Feder, et al.,[5] identify the ways in which outdoor learning environments are beginning to take over the academic world, and how this shift can support the goals of educational institutions worldwide. The paper identifies "a 'strands of scientific learning' framework that articulates science- specific capabilities supported by informal environments." These strands (1-6), identify specific ways informal learning environments can benefit students learning science, although the principles are reflective of any subject to be taught in these informal learning spaces; each strand promotes a hands-on learning environment that allows students a true "learn by doing" approach:[6]

Strand 1: Experience excitement, interest, and motivation to learn about phenomena in the natural and physical world;

Strand 2: Come to generate, understand, remember, and use concepts, explanations, arguments, models, and facts related to science;

Strand 3: Manipulate, test, explore, predict, question, observe, and make sense of the natural and physical world;

Strand 4: Reflect on science as a way of knowing; on processes, concepts, and institutions of science; and on their own process of learning about phenomena;

Strand 5: Participate in scientific activities and learning practices with others, using scientific language and tools;

Strand 6: Think about themselves as science learners and develop an identity as someone who knows about, uses, and sometimes contributes to science.

4   Banning and Strange, 109.
5   Feder, M. A., Shouse, A. W., Lewenstein, B., & Bell, P. (2009). Learning science in informal environments: People, places, and pursuits.
6   Feder, et al., 2009.

These strands effectively analyze ways to get students to participate in active learning within an unconventional space. The strands identify ways a physical space can excite a student's imagination, promote learning, and drive a student to participate. A primary way to get students to interact with their environment is through the practice of behavior setting within urban design.

Behavior setting is the practice of designing spaces that influence certain behaviors through intentionally placed cues[1]. Behavior setting principles are successful when a user arrives in a space and immediately know its purpose. For example, a public plaza with tables and chairs encourages a user to sit, relax, eat lunch or read a book. A plaza with public art, fountains, and historical markers is meant to draw users in for educational purposes, while providing a relaxing setting. Educational spaces, when implemented through behavior setting, provide features and tools for users to interact with a space in an educational manner. "The functionality of the campus physical environment… affords and constrains certain activities,"[2] meaning that a public space will only produce as much as it serves. A space with limited seating, shade, and some tables for working cannot simply call themselves an educational space because it does not invoke specific behaviors from a user. These characteristics within a space are referred to as cues, subtle elements within an environment that invoke educational behaviors. Much like "low lighting, soft music, and comfortable seats encourage people to spend more time in a restaurant or bar,"[3] educational cues within the physical environment can be used to "increase the probability of a desired outcome."[4] These cues can take the form of displays of student projects, physical structures, diversity of shade and sun, and comfortable seating that is flexible enough to be moved around to accommodate different size groups. These cues encourage students to utilize a space longer than a few passing moments. Locations such as amphitheaters with a small platform stage can send a cue to an educator that the space is available for teaching opportunities.

Outdoor learning spaces have an overall objective of invoking participation from users, and providing spaces for collaborative learning. Although the ways in which these spaces can be implemented is minimally understood, the benefits of outdoor learning and collaborative environments is far from a new topic in planning. University campuses have an opportunity to provide innovative forms of learning for students, and the potential for student success within these spaces is limitless, and reflects the goals and values of such institutions.

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1   *Banning and Strange, 2001.*
2   *Banning and Strange, 15.*
3   *Banning and Strange, 17.*
4   *Banning and Strange, 20.*

2.2 Social Spaces

A social space in the public realm serves as a bridge between the built and natural environment. Public spaces, regardless the location within the environment, provides an oasis from the mundane aspects of the built environment with innovative techniques aimed at sparking movement and activity between those who engage within the space. Social environments "are dynamic and change over time," [1] as they adjsut to meet the needs of an evolving populus. Additionally, these spaces and plazas, when created within the public realm, provide an environment that establishes a true social environment that a user can engage with. "Social man is as much the product of his social environment as he is of physical surroundings." [2] Physical components of space are used as cues to create a desired environment that serves a purpose for the greater public, for any demographic imaginable.

Social gathering spaces are one of the most important types of open spaces and plazas in modern day city centers[3]. Social gathering spaces serve many roles within a community, and ultimately "help support both personal development goals as well as career development goals" [4] through promoting personal development, self-belief, and collective knowledge[5]. In a world that is becoming increasingly disengaged with their environment, these social spaces are becoming emphatically more essential to the vibrancy of urban centers. Metropolitan areas, college campuses, and intimate downtowns across the world should be implementing smart outdoor design to enhance the quality of life for citizens through prioritizing outdoor social gathering spaces to allow communal social and personal goals.

Social environments on university campuses are those that foster student engagement through their natural or built environment. These environments are serving a specific populous: those seeking education and knowledge, whether they are a student, staff, or faculty at the institution. Social environments on a college campus shall place immense consideration on the "degree of fit between persons and environments," [6] resulting in social spaces being planned specifically with the demographics of educators and students in mind. The two main elements of college life that contribute to student success are the educational and social characteristics of their environment. The design of the "campus physical environment, with its designs and spaces, can influence and make a difference in the lives of students, faculty, and visitors to the campus"[7], and therefore shall be planned

1   Barnett, E., & Casper, M. (2001). Research: A Definition of "Social Environment" (Vol. 91, Rep. No. 3). American Journal of Public Health.

2   Mundra, A. (2015, April 23). Social Environment: Meaning, Concept and Features. Retrieved November 25, 2017, from http://www.sociologydiscussion.com/society/social-environment-meaning-concept-and-features/2445

3   Hauenstein, P. (2014, January 23). The Importance of Social Environments for Personal Development. Retrieved November 30, 2017, from http://www.theomniview.com/pov/blog/the-importance-of-social-environments-for-personal-development/

4   Hauenstein, 2014.

5   Hauenstein, 2014.

6   Banning and Strange, 52.

7   Banning and Strange, 15.

with those stakeholders in mind.

In a collegiate context, social gathering spaces are primarily confined to the indoors. At universities with undesirable outdoor spaces, students choose to stay indoors, a common occurance on campuses where a library or café serves as the primary gathering spot. This tendency to gather in otherwise academic locations disrupts the desired intention of a space, in this case a library meant for studying is transformed into a social meeting space, likely negatively affecting the students using the space for its intended purpose. However this misuse of space is not always a solely negative truth. Universities can plan for social hubs that integrate learning areas and practies, effectively uniting the needs of different student demographic types. [8]

Outdoor public spaces play a vital role in the establishment and maintenance of healthy socioeconomic environments for students[9]. An important social resource, public spaces that enhance social gathering helps support existing relationships, and introduces the possibility for the new ones. The Joseph Rowntree Foundation conducted a study on the function and importance of public gathering spaces, and identified several key components, outlined below[10]:

> - Public spaces create a 'self-organising public service' by providing a shared resource that aims to facilitate the generation of memories and experiences;
> - Public spaces offer spaces for communities to showcase culture, interests, and desires;
> - Public spaces are fluid, and they mean and offer something different depending on the time of day and year;
> - Public spaces are a useful and distinct place for youth to congregate and engage;
> - Public spaces are the 'social glue' needed in urban centers;
> - And, finally, people make places more than places make people.

As a collective, these components of public space create a clear understanding of the role public and social gathering spaces play in a community. A community requires open spaces be accessible, but also fluid in order to accommodate the breadth of needs expressed within a community. This argument towards flexible design is nicely discussed by Banning and Strange who write "we are much more likely to achieve an optimum environment when critical decisions about constructing and changing the environment are in the hands of people who live and function in it."[11] "The idea that people make places more than places

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8	*Rouse, H. (2011, May 6). College Struggles With Social Space | News. Retrieved November 30, 2017, from http://www.thecrimson.com/article/2011/5/6/space-social-students-harvard/*
9	*Worpole, K. (2007). The Social value of Public Spaces (Rep.). Joseph Rowntree Foundation.*
10	*Worpole, 2-3.*
11	*Worpole, 3.*

make people"[12] expresses a need for public spaces to be flexible in design to accommodate any potential user. A social space can offer many different activities and opportunities, but these activities and opportunities must reflect the general needs of the public in order to be successful[13]. An urban planner can spend millions of dollars creating a beautiful public space with modern furniture and intricate water features and landscaping- but if this space is not fitting a need for a community, there will be no use of the space as it is not tangible for the people it must ultimately serve.

Creating unique public spaces that attract social gathering and communication can be easily implemented if several key considerations are made. The American Planning Association has a publication discussing the guidelines for great public spaces. The APA defines the function of great public spaces as follows[14]:

- Promotes social activities and human contact;
- Must be safe, welcoming, and accommodating to all potential users;
- Visually interesting design and amenities;
- Promotes community engagement;
- Reflects local culture or history;
- Relates well to bordering uses;
- Must be well maintained;
- And, has a unique or special character.

Public spaces must essentially be an experience that a user engages with throughout the entirety of their visit to the public space. Open spaces must become a sensory experience in order to capture and maintain usership throughout its lifetime. An enticing feature must bring users in, and varying functionality of the space shall keep them there as long as possible. These principles of public social spaces integrate quite seamlessly with those of outdoor learning environments. Both spaces require the ability for users to interact with a space- whether it be through tangible learning equipment or through flexible furniture and amenities. Additionally, ease of access and implementation of community needs and desires is key to the success of these open spaces. However, more consideration for the audience of these public spaces is required for ultimate success of both the space, and a student.

Many studies have indicated that the success of a social environment, whether educational or not, is dependent on the personality traits and habits of the user. Moos notes that "The character of an environment is implicitly dependent on the typical characteristics of its members."[15] Characteristics and habits of those who interact with a social space "influence the degree to which people are attracted to,

12   Worpole, 2.
13   Worpole, 2007 and Banning and Strange, 2001.
14   APA. Characteristics and Guidelines of Great Public Spaces. (n.d.). American Planning Association. Retrieved November 03, 2017, from https://planning.org/greatplaces/spaces/characteristics.htm
15 Banning and Strange, 35.

[and] satisifed within" a space. The Holland Vocational- Interest Personality Types[16] identifies six personality types typically present at an educational institution, and analyzed the ways in which each personality type interacts with public space. The personality types are outlined here[17]:

> **Realistic:** a student who values the explicit, tangible features of an environment, and lacks ability to maintain meaningful human relations;
> **Investigative:** a student who is curious about the environment they are in, an intellectual with little interest in social interactions;
> **Artistic:** a student who seeks unstructured educational and social interactions, and prefers the ability to manipulate the environment that surrounds them;
> **Social:** a student who prefers interaction with other over academic success;
> **Enterprising:** a student who seeks opportunities to manipulate others to attain goals either within a confined space, or in a more broad context;
> **Conventional:** a student who prefers the ability to manipulate data and concrete material for success in organizational goals.

Each of these personality types have traits that can be exemplified through planning an environment to extract their desired behaviors. A space with flexible design in furniture and materials will satisfy the needs of the realistic, investigative, artistic, and conventional personalities. These manipulations of furniture also allow a space to be dynamic and flexible in nature, promoting fluid social gathering needed for to support social and enterprising personality types.

No matter the personality type, or the desired activity to engage in within an outdoor space, a sense of inclusion is essential for any outdoor space. Outdoor spaces that feel inclusionary must feel complete in nature. With a modern world that has slowly evolved at the hands of architects and planners from different eras, a trend of fragmented urban spaces is being seen. A large push of modern urban planning and architecture is focused on the filling in of underutilized spaces, aiming to create a cohesive environment that serves as inclusive space for all. This new concept of social inclusion is being partly accomplished through the new urban intervention trend.

Webster's Dictionary defines "Intervention" as: the act or fact of interposing one thing between or among others[18]. An intervention, no matter the context, is generally intended to make something better for an individual or a group. City planners and architects have spent many decades revisiting practices of intervention and attempting to determine how interventions can play a role in land use and planning. Urban interventionism, as a field, is quite difficult to accurately define as a whole. Urban interventionism "plays a key role in the

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16   Holland, 1973.
17   Holland, 14-17.
18   "Intervention." Merriam-Webster, Merriam-Webster, www.merriamwebster.com/dictionary/intervention.

regeneration of cities, contributing to the balance and cohesion of the urban dynamic… currently…composed by various and diverse parts"[19]. The concept of urban intervention, in its most simple form, is the act of infilling lost spaces in urban centers to create a more cohesive environment. This practice is similar to that of urban revitalization or infill, and is often characterized by historic or cultural markers established in the space to highlight history.

The main objective of urban intervention is to facilitate a cohesive environment. This means taking underutilized spaces in activity centers (urban cores, schools, commercial centers), and turning them into something tangible. Revitalizing these spaces can mean an entire host of benefits for a community, the most tangible being a space for congregation. Urban interventions of the modern day take the form of pop-up parks, or parklets, that offer an adaptive reuse of lost spaces. There are several characteristics of these urban interventionist spaces that are key for consideration, namely public art, historical markers, and flexible urban furniture.

Urban intervention in the form of public art is one of the key ways to gain attraction to an area. Having a piece of public art in a plaza space can establish a sense of place, of identity, that draws users to an area. A public area with a lawn is effective, but not as effective as a public lawn with physical markers in the form of public art. Additionally, use of art in public spaces provides exposure to local artists, and provides a way for local artists to feel one with their community. In the novel Urban Intervention: Street Art, and Public Space, a distinction is made on what it means to be an urban artist in a historical context. The authors claim that "public space can also be seen as the place for the expression of the difference, the transgression… for the expression of the diversity of identities"[20]. This thought of public spaces and art being mixed with the establishment of the identity along with history is a key aspect of urban interventionist practices.

Historical context is another form of urban intervention expression that is taking shape in the modern world. According to Marta Silva, there is a "devaluation of historical city centers, due to population growth and development of cities" [21] that is effectively eliminating historical markers from cities. Therefore, a focus on established local history shall be focused on to commemorate the evolution of the city center itself. Mixing old with new is not a messy act as some perceive it. Mixing old and new, the past and the future, is essential in both preserving history, and protecting the future.

The third aspect of urban intervention is flexible urban furniture. Public art and historical markers are tools in which to attract someone to a space. Intriguing urban furniture is how you get someone to stay in and interact with a space for

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19   Silva, Marta. "Contemporary interventions in public spaces and buildings Patrimonial, social and urban effects." Tecnico Lisboa, 2015.
20   Costa, Pedro. Urban Intervention, Street Art and Public Space. Urban Creativity Organization, 2017.
21   Silva, 6.

longer than a passing moment. Flexible urban furniture is street furniture that is able to move around and suit the needs of the user. These mainly constitute tables and chairs that are not tethered down, and are able to be moved around at the will of the user. These types of furniture accommodate a variety of people and their needs within the space. This allows a space to deal with the diverse and ever-changing urban environment. Additionally, allowing a user to interact with a space as much as possible can enhance the overall experience someone has within the space itself. This can provide an external purpose to the use of the space, meaning someone is gaining a positive experience out of a space beyond what they intended it to.

Overall, urban intervention, as complicated as it seems, it quite simple. Enhancing lost spaces in urban centers helps to create a more cohesive environment in which people are able to interact with a space in several different ways. Preservation of history, local artist expressions, and interactive furniture and displays are several ways in which adaptive lost space reuse can be facilitated to enhance site design and functionality.

As a college campus evolves over time, and new classrooms, dorms, cafeterias, and libraries are constructed, areas of campus can become fragmented and underutilized. If using urban intervention practices, and incorporating social design theories in revitilization efforts of these places, a college campus can become a dynamic place with every space within the campus boundary being used for student success. When these social spaces are then incorporated with outdoor learning spaces, the possibilities for behavior setting, and for fostering the success of each and every student becomes more tangible.

3.0 LOGISTIC REGRESSION

3.1 Why Survey?

Although doing an adequate amount of research on the subject of outdoor design may develop a thorough understanding of how to do so, a truly effective outdoor design must also consider the needs and desires of those it will ultimately serve: the students. In effort to cross reference the theories examined in the literature review, surveying of students was conducted for this study. The results of the student surveying, although not entirely surprising in themselves, contradict some assumptions made in the early stages of this report. This revelation is a potential representation of how assumptions made in modern architecture and planning can be falsley adopted.

3.2 Methodology

Logistic regression is a data calculation tool for predicting "probability of a categorical outcome based upon a set of independent or predictor variables" (2). Logistic regression works to determine the probability at which a certain outcome will occur based on the independent variables being considered. For the purpose of campus planning, logistic regression is useful when attempting to predict preferences in site design. For the function of this report, logistic regression was run for four (4) activities, each against the same list of 21 different design attributes that tend to occur in outdoor public spaces on university campuses. In this case, the activities were the dependent variable and the 21 design attributes served as independent variables.

A total of 22 students were surveyed from a design course in the department of City and Regional Planning at California Polytechnic State University- San Luis Obispo (Cal Poly). The students were second year undergraduate students working on a design proposal for the Cal Poly campus, and thus had experience conceptually manipulating space types with various design attributes.

The four (4) dependent variables for each run of the survey were activity-based questions as follows:

> 1. Which of these two photos of outdoor spaces would you prefer to study alone in?

> 2. Which of these two photos of outdoor spaces would you prefer to work in a small group of 2-3 in?

> 3. Which of these two photos of outdoor spaces would you prefer to work in a large group of 4 or over in?

> 4. Which of these two photos of outdoor spaces would you prefer to relax

in?

The 21 independent variables in which students were comparing to the various

Table 1: The 21 Design Attributes & Logistic Regression Independent Variables

Small Table (4 or less)	Wild Nature	Surrounded by Building
Large Table (more than 4)	Water	Circular Arrangement for Group Discussion
Seating	Small Planter	Central Space for Performance
Lounging Chair (hammock or similar)	Lawn	50% or More is Paved
Movable Chair	Active Edge	Unique Design
Tensile Shade	Enclosure	Number of Accent Colors
Tree Shade	Surrounded by Tree	Number of People in Photo

activities were design attributes shown in the outdoor photos of each chosen space. Independent variables were as follows:
Students were each given an identical packet of 40 photos, each photo being of an outdoor space that had one or more of the above design attributes. Photos were shuffled and split into an evenly distributed "A" and "B" pile. Students were then asked to run through 20 random photo pairings for each activity. For example, students were asked to run through their piles of photos and pick which photo they would rather do activity #1 (study alone) in, then asked to repeat for each activity. This exercise was to collect variable data for each activity type in hopes of finding a trend in the attributes students prefer for specific outdoor activities.

This style of survey is referred to as a Visual Preference Survey, aimed at collecting subconscious and unbiased responses from respondents. Each photo exhibited a random design attribute, and was given a score of either 0-1 or 0-2. Based on the preference students had made from each random pairing, analysis of the success of each design attribute for each particular activity was possible. Through running the logistic regression based on student responses, a trend of both favored and unfavored attributes emerged. Five (5) logistic regressions were run, one (1) for the design attribute preference trends for all activities combined, then one (1) for each individual activity. Each model was run twice, once with all independent variables accounted for, and one with all independent variables except for "Number of Accent Colors" and "Number of People in Photo." This distinction produced two separate models of which the most helpful model was chosen to analyze, denominated below as either "all attributes" or "limited attributes" for which model was chosen.

3.3 Results

The following analysis uses the logistic regression data to take the sum of outcomes from each student, and attempt to predict the probability of a specific outcome. In tables 2 through 6, the statistics being analyzed will be the "B" coefficient and the "Significance." The scientific definition of coefficients in logistic Regression is each exponentiated coefficient serves as the ratio of two odds, or the change in odds in the multiplicative scale for a unit increase in the corresponding predictor variable holding other variables at a certain value. Summarily, the significance indicates which attributes were important to respondents when they were compared to each activity, and the B coefficient measures whether the significant response to each attribute was negative (unfavorable) or positive (favorable) in nature.

Table 2: Regression #1 - All Activities

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1^a	Table up to four people	.491	.088	30.778	1	.000	1.634
	shaded with tensile structure or similar	-.165	.091	3.270	1	.071	.848
	Wild nature	-.534	.119	19.960	1	.000	.587
	Lawn	.413	.100	16.958	1	.000	1.512
	Enclosure, 1:1 ratio or more	.306	.051	36.533	1	.000	1.358
	50% or more is paved	.405	.098	16.909	1	.000	1.499
	Constant	-.527	.052	103.280	1	.000	.590

The variables table above reflects how each attribute's significance affects the overall outcome of the model. Table 2 shows the individual estimates for each independent variable (design attribute) for all activities. Therefore, we can interpret the effects of each predictor on the outcomes. For example, the presence of seating and of circular arrangements for group discussion are both significant to respondents when they are deciding which outdoor space to engage in activities in. A low P-value (significance) means that specific independent variable was meaningful when respondents chose their preferred photo for each activity.

Table 2 shows the calculated results of the binomial logistic regression with the lowest Chi-square (the best fitted model, Chi-square=159, p=0.000). All variables are significant at 0.05 level, except "shaded with tensile" that has P=0.71. Wald value shows the contribution each design attribute gives to the overall model. *Enclosure and table up to four people* have the highest contribution and *shaded with tensile structure* has the lowest. *Table up to four people, presence of lawn, enclosure, and 50% or more paved area* are positively correlated with the selection of photo and *shaded with tensile, and wild nature* are negatively correlated.

Table 3: Regression #2- Study Alone

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Table up to four people	.468	.207	5.117	1	.024	1.596
	Seating	.595	.186	10.254	1	.001	1.813
	water	-.600	.219	7.506	1	.006	.549
	Surrounded by tree	.285	.106	7.175	1	.007	1.330
	Surrounded by buildings	.342	.119	8.295	1	.004	1.408
	circular arrangement for group discussion	-.612	.191	10.307	1	.001	.542
	number of accent colors	.209	.070	8.792	1	.003	1.232
	Constant	-.383	.104	13.623	1	.000	.682

Table 3 shows the calculated results of the binomial logistic regression with the lowest Chi-square (the best fitted model, Chi-square=52, p=0.000) for the study alone activity. All variables are significant at 0.05 level or lower. Based on the Wald statistic, *seating and circular arrangement for group discussion* have the highest contribution and *table up to four people* has the lowest. *Table up to four people, seating, surrounded by trees or buildings, and number of accent colors* are positively correlated with the selection of photo while *water and circular arrangement for group discussion* are negatively correlated.

Image 1: Example of a space surrounded by buildings, shaded with tensile structure, and surrounded by landscaping

Image 2: Example of a space with wild nature and water

Image 3: Example of a space surrounded by trees and shaded by a tensile structure

Image 4: Example of a space with tables up to four people.

Table 4: Regression #3- Small Groups

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1ᵃ	Table up to four people	1.248	.211	35.086	1	.000	3.485
	lounging chair, Hammock, or similar	-.485	.193	6.321	1	.012	.615
	Wild nature	-1.244	.320	15.117	1	.000	.288
	small planters	-.594	.248	5.733	1	.017	.552
	Enclosure, 1:1 ratio or more	.660	.120	30.209	1	.000	1.935
	50% or more is paved	.873	.215	16.474	1	.000	2.393
	Constant	-.548	.122	20.166	1	.000	.578

Table 4 shows the calculated results of the binomial logistic regression with the lowest Chi-square (the best fitted model, Chi-square=157, p=0.000) for the small group studying activity. All variables are significant at 0.05 level or lower. Based on the Wald statistic, *table up to four people and enclosure* have the highest contribution and *small planters* has the lowest. *Table up to four people, enclosure and 50% or more is paved* are positively correlated with the selection of photo while *lounging chair, wild nature, and small planters* are negatively correlated.

Table 5: Regression #4- Large Groups

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1ᵃ	Table for more than 4 people	1.226	.268	20.956	1	.000	3.409
	Wild nature	-.734	.279	6.917	1	.009	.480
	water	-.812	.234	12.012	1	.001	.444
	circular arrangement for group discussion	1.109	.182	37.050	1	.000	3.031
	Constant	-.507	.118	18.607	1	.000	.602

Table 5 shows the calculated results of the binomial logistic regression with the lowest Chi-square (the best fitted model, Chi-square=134, p=0.000) for the studying in large groups activity. All variables are significant at 0.05 level or lower. Based on the Wald statistic, *table for more than four people and circular arrangement for group discussion* have the highest contribution and *wild nature* has the lowest. *Table for more than four people and circular arrangement for group discussion* are positively correlated with the selection of photo while *wild nature and water* are negatively correlated.

Table 6: Regression #5- Relaxing

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1ᵃ	Seating	-.450	.152	8.746	1	.003	.637
	lounging chair, Hammock, or similar	.516	.175	8.712	1	.003	1.676
	shaded with tensile structure or similar	-.358	.172	4.326	1	.038	.699
	small planters	.581	.179	10.501	1	.001	1.788
	Lawn	.516	.180	8.207	1	.004	1.676
	circular arrangement for group discussion	-.395	.166	5.688	1	.017	.674
	Constant	-.578	.106	29.746	1	.000	.561

Table 6 shows the calculated results of the binomial logistic regression with the lowest Chi-square (the best fitted model, Chi-square=28, p=0.000) for the relaxing activity. All variables are significant at 0.05 level or lower. Based on the Wald statistic, *lounging chair, small planters and lawn* have the highest contribution and *shaded with tensile structure, circular arrangement for group discussion and seating* has the lowest. The presence of a *lounging chair, small planters and a lawn* is positively correlated with the selection while *seating, shaded with tensile structure, and circular arrangement for group discussion* are negatively correlated.

Image 5: An example of a relaxing space with lounge seating

Image 6: An example of a relaxing space in wild nature

4.0 LOGISTIC REGRESSION ANALYSIS

Overall, the Visual Preference Survey (VPS) did not yield striking results. The data shows that students tended to prefer design attributes that are positively correlated to facilitating each specific activity, while the students were unattracted to design attributes that would inhibit their ability to carry out an intended activity. For example, students preferred to utilize spaces with large tables when they are meeting with a large group, furthermore avoiding spaces that cannot accommoadate their large group. While research and industry assumptions are helpful in understanding how a student will interact with a space is important, listening to the needs and desires of the students themselves is essential. Tying urban design practices together with the results from this survey will compile a holistic understanding of how to design outdoor spaces to successfully serve student success.

4.1 Overall data: All Activities

Regression #1 calculated the most significant design attributes for all activities combined. Students reacted in favor of *having tables up to four people, lawns, enclosure, and 50% or more of the space being paved.* This suggests that for all activities, the most preferred outdoor spaces to engage in any of the four activities were ones that had small tables, had greenery through the use of lawns or small patches of grass, were in an area enclosed by buildings, and were paved.

Alternatively, for the summary of all activities, students reacted negatively towards spaces *shaded with a tensile structure and wild nature.* These suggest that students prefer outdoor spaces that have either direct sunlight or are shaded by greenery.

4.2 Activity 1: Studying Alone

After understanding general preferences for all activities, analysis from the VPS was used to understand what design attributes students prefer to have in spaces they are using for one specific activity. Understanding individual activities and their associated design attributes can benefit designers working on dynamic spaces to integrate activities with one another, because a specialized understanding of the needs for each activity will be available.

Regression #2 calculated the most significant design attributes for just the study alone activity. Students reacted in favor of having *tables up to four people, seating, being surrounded by trees and by buildings, and number of accent colors* which suggests that for studying alone, the most preferred outdoor spaces to study alone in were ones that had small, individual tables, had movable seating, and were surrounded by plants and materials that caught the eye with contrasting colors.

4.3 Activity 2: Studying or Working in Small Groups (under 4)

Regression #3 calculated the most significant design attributes for just the studying or working in small groups under four activity. Students reacted in favor of having **tables up to four people, enclosure, and having 50% or more of the atmosphere being paved** which suggests that for studying or working in small groups, the most preferred outdoor spaces were ones that had smaller tables with ample seating, and were in locations that felt developed. These could be areas next to and in between buildings with high foot traffic.

Alternatively, for the summary of studying or working in small groups, students reacted negatively towards spaces with **lounging chairs, wild nature, and small planters.** These suggest that, similar to spaces to study alone in, students prefer outdoor spaces that feel occupied. Again, drawing off of the hustle and bustle of the world happening around them, students prefer to work with a small group in an area that feels stimulating and energetic.

4.4 Activity 3: Studying or Working in Large Groups (over 4)

Analysis of regression #4 yielded the most significant design attributes for just the studying or working in large groups over four activity. Students reacted in favor of having **tables for more than four people and for circular arrangement for group discussion.** Alternatively, students reacted negatively towards spaces with **wild nature and water.** Unlike the results for studying or working in small groups, these suggest that when studying in large groups over four people, students were less concerned about their surrounding environment. Students preferred a space that facilitated discussion through the use of urban furniture.

4.5 Activity 4: Relaxation

Regression #5 showed students preferring the presence of a **lounging chair, hammock, or similar, small planters and presence of a lawn** while wanting to stay away from the presence of traditional **seating, circular arrangements for group discussion, and shade from a tensile object.** These preferences suggest that students, when looking for a place to relax, are not only looking for landscaping in their environment, but they are looking for informal seating, being able to use a space for what they want it for– solitude. Students are looking for spaces where they can lounge about; a lawn with some tree shade, some light landscaping, perhaps some comfortable lounge seating. They are not wanting to relax in forced environments where there is traditional seating, or areas in which they would feel a need to interact with one another, such as in a space with an amphitheatre.

5.0 DESIGN GUIDELINES

As discussed in the literature review, outdoor learning spaces shall be designed to accurately facilitate student success. Outdoor spaces meant for learning shall have features within the physical environment that encourage learning and development, but that also support social behaviors[1]. Student success depends largely on their physical environment, and spaces that utilize diverse environments can increase student adaptability, and provide locations where students naturally interact with a space in a productive manner. Furthermore, diverse outdoor spaces are proven to reduce student stress, increase concentration, and promote a healthy and active lifestyle.

With prior research on the subject by Banning and Strange, the three tiers of success previously discussed (safety and inclusion, involvement, and inclusion) can be effectively executed through integrating both industry knowledge, and results from the VPS.

Campuses that are wishing to build spaces that are versatile and offer amenities that encourage a range of activities should utilize various design attributes to encourage sporadic use of space. Additionally, the design of a space shall also include tactics to implement behavior setting . Behavior

Image 7: Individual behavior setting

setting priciples are successful when a user arrives in a space and immediately knows how they are meant to use it. For example, stumbling upon an area with small, singluar desks will encourage someone to be alone, isolated from others, such as in Image 7. Alternatively, when a user stumbles upon an environment as seen in Image 8, the use of the space is left to interpretation. People in Image 8 are seen eating or studying either alone or in various sized

Image 8: Group behavior setting

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1   *(Banning and Strange, 31).*

groups, some even using the space for social activities such as catching up with friends. This type of design is much more fluid and versatile in nature. Both Images 7 and 8 exhibit ways in which behavior setting can successfully be implemented. When designing a space intended for isolated, singular use, the presence of small individual tables will encourage solitary activities, while Image 8 encourages collaboration but accommodates solitary use of the space.

From the VPS, student's negative response towards having wild nature, and the positive response to having paving and enclosure, suggests a desire to utilize outdoor spaces that feel developed. These are such spaces as paved plazas, atriums, or courtyards. These spaces are clearly built out, with pavement, and buildings surrounding them, yet they feel natural through the use of diverse landscaping or through the marriage of sun and shade. For a space meant to be dynamic in nature, diverse design attributes should be used to meet the various needs of students, while taking into consideration the desires of students as shown in the VPS. Students prefer basic design foundations such as paving and landscaping, yet use of industry knowledge on behavior setting can be used to accommodate more than one activity within that space.

Understanding the foundational variable of each design attribute is key to its effective use within a space. The 21 design attributes can be split between three variable categories: natural environment, built environment, and setting. This classification can be seen in the table below.

Table 7: Design Attributes Classified by Variables

Natural Environment Variables	Built Environment Variables	Setting Variables
Shaded with Tree	Shaded with tensile or similar	Table up to four people
Surrounded by tree	Active Edge	Table for more than 4 people
Small planters	Enclosure, 1:1 ratio or more	Fixed seating
Lawn	Surrounded by buildings	Movable Seating
Wild nature	Number of accent colors	Lounging chair, Hammock, or similar
Less than 50% is paved ground	Unique Design	Circular/ face to face arrangement
Water feature	Number of people in photo	Central space for performance/presentation

The development of an outdoor space, when done correctly, will work to harmoniously blend the natural and built environment with setting variables. Setting variables are the physical additions to a space such as urban furniture or an amphitheatre. When a campus is working on designing a space for outdoor consumption, dynamically understanding the influence each of the variables has on the feel and success of the environment will be what ultimately makes or breaks a space.

5.1 Studying Alone

The purpose of study alone spaces is to provide an environemnt in which a student can avoid distractions and focus on their purely academic needs. These spaces are typically seen in coffee shops, libraries, and cafeterias. These spaces provide an atmosphere with ambient noise– spaces that make a person feel as if the world is happening around them. And yet, as the world is carrying on around them, these spaces offer private tables and seating, as well as visual relief that allow one to feel as if they can withdraw and focus on their own work, tuning out the bustling happening around them. Student's preference for spaces that feel enclosed, either by a tree or a building, reflects a desire for this type of environment while studying- an environment that feels energetic and inspiring, while offering calming visual relief such as landscaping, accent colors and materials, or art pieces.

One common design attribute in these spaces, supported by VPS analysis, is the presence of small tables. When a student is looking to study alone in a space, whether it be a cafeteria, a coffee shop, or a library, they are likely looking for ambient noise, and for being in a space that feels productive and active. This type of location, when built outdoors, is preferrable because it means blending study alone areas within a space for dynamic use. Studying alone in an outdoor area where other groups are studying with friends, eating, or chatting will provide many of the same attributes as the traditional places students choose to study in. To the right are design goals and guidelines for studying alone spaces, formulated through VPS results and industry literature review.

5.1.1 Goals for study alone spaces

Goal 1: Provide spaces that accommodate different types of study habits, ranging from needing ambient noise to needing solitude.

> *Guideline 1.1:* Locate spaces for ambient noise near existing active uses such as a cafeteria or coffee shop

> *Guideline 1.2:* Use landscaping or tensile screening to create the illusion of a more solitary environment when needed.

Goal 2: Provide furniture that accommodates singular use.

> *Guideline 2.1:* Use smaller, lightweight tables to accommodate moving and shifting of table position when needed for further privacy or perhaps a larger study group.

> *Guideline 2.2:* Movable seating may be used to enhance student comfort and mobility.

Goal 3: Use landscaping to break up space and lighten an environment.

> *Guideline 3.1:* Mix of canopy shade, as well as ground coverage to diversify landscaping use.

Goal 4: Creating spaces that are visually appealing and inviting.

> *Guideline 4.1:* Setting variables such as chairs, tables, and surrounding building design can be diversified in color and material.

Image 9: An example of how to execute guidelines 1.1, 2.1, 2.2, 3.1 and 4.1.

Image 10: An example of how to execute guidelines 1.1, 2.1, 2.2, 3.1, and 4.1.

5.2 Studying or working in small groups (under 4)

Additionally, a stimulating and energetic space also enhances social interactions. Not only would small groups working on a school project, but small groups of friends looking to catch up, drink coffee or play games outdoors can also be attracted to a space that feels energetic. Some common spaces on a campus to find this type of space is at a library, an atrium, or a large cafe. Each of these spaces offers many similar design attributes to that of the studying alone activity, namely ambient noise and the feeling of a bustling world around you. These spaces are dynamic, always changing, and are energetic in nature. To the right are design goals and guidelines for small group gathering spaces, formulated through VPS results and industry literature review.

Image 11:An example of how to execute guidelines 1.1, 2.1, 2.2, 2.3, and 2.4

Image 112:An example of how to execute guidelines 2.1, , 2.2 and 2.4.

5.2.1 Goals for small group gathering spaces

Goal 1: Provide a space to comfortably accommodate under five people.

> *Guideline 1.1:* Use of lightweight tables and chairs to accommodate moving and shifting of group position when needed for discussion or comfort.

Goal 2: Creating spaces that are visually appealing and inviting while creating a sense of safety.

> *Guideline 2.1:* Provide hardscaped ground surfacing.

> *Guideline 2.2:* Provide colorful setting variables such as chairs, tensile shade options, and tables.

> *Guideline 2.3:* Landscaping features can be used to give illusion of privacy and comfort.

> *Guideline 2.4:* Provide overhead and surrounding enclosure through use of various materials and landscaping to enhance sense of safety and comfort.

5.3 Studying or working in large groups (over 4)

When studying or working in larger groups, the design of the physical outdoor space does not matter so much as does the furniture. Having larger tables to accommodate larger group sizes and having movable seating is a great way to attract a group wanting to work together outside. However, this doesn't mean that the surrounding environment should not be considered. Some outer physical elements such as climate and location play a significant role when choosing an outdoor space to use for meeting with a larger group. If an outdoor study area for large groups is being pelted by rain, or the temperature is sweltering hot with no shade, students will simply choose to meet indoors. Having various types of design attributes could add to the versatility of the space, having some areas be shaded, some not being shaded, and some being only partially shaded, which would further address climate changes that may occur. To the right are design goals and guidelines for large group gathering spaces, formulated through VPS results and industry literature review.

Image 13: An example of how to execute guidelines 1.1, 2.1, and 2.2.

Image 14: An example of how to execute guideline 2.1.

5.3.1 Goals for large group gathering spaces

Goal 1: Provide a space where various large group sizes feel comfortable congregating for both social and academic activities.

> *Guideline: 1.1* Larger tables with set seating arrangements allows for physical control of a space within the potential chaos of a larger group.

Goal 2: Plan for a space that allows for group expression.

> *Guideline 2.1:* Use of circular arrangement tables and seating can allow for integrative group discussion.

> *Guideline 2.2:* Construction of a small amphitheatre space to allow for group presentations, class gatherings, or casual social interactions.

5.4 Relaxing

Spaces meant for relaxing have lots of flexibility from a design perspective, because students in the VPS didn't have high expectations or a long list of desires when considering a space they would like to relax in on campus. Some typical spaces to see students relaxing are on large campus lawns. These spaces offer very few planned design attributes, they are very versatile because they allow a user to make out of them what they desire. A person can choose to read a book, listen to music, watch people go by, basque in the sun, lay under the shade of a tree, or even practice yoga. A flat space for student relaxation is a very useful tool for aiding students in relieving stress because it would allow them to lay down to nap, or to lounge about with friends. To the right are design goals and guidelines for relaxing spaces, formulated through VPS results and industry literature review.

5.4.1 Goals for relaxing spaces

Goal 1: Plan for a space that facilitates various needs and desires for students looking to relax

> *Guideline 1.1:* Landscaping such as lawns and trees provide a natural setting escape from academic stress.
>
> *Guideline 1.2:* Mix of tensile shade, tree shade, and sun areas.
>
> *Guideline 1.3:* Area specifically designated for lounging, such as a space for hammocks or lounging seating.

Image 15: An example of how to execute guidelines 1.1, 1.2, and 1.3.

Image 16: An example of how to execute guidelines 1.1 and 1.3.

5.5 Inclusionary Spaces

The difficult part of designing outdoor spaces is when trying to harmoniously blend different design attributes together to create a space in which students would feel comfortable engaging in any activity at any given time. This would mean having spaces that feel comfortable studying alone, meeting with different sized groups, while also having space for relaxation all in the same location. When looking at the average college campus, at any given time, there are a host of activities occuring in the same place. A campus lawn can be a space for studying, for reading a book, sunbathing or catching up with a friend. Classes can be held on one side of the lawn while the other end is used for volleyball or frisbee. These types of environemnts are referred to as dynamic, meaning they change over time to accommodate what is needed at any given moment . The use of these spaces on a campus, specifically on college campuses, are beneficial because they serve a a greater population than a space with more limiting design attributes. To the right are design goals and guidelines for inclusionary spaces that accommodate all four activities above, formulated through VPS results and industry literature review.

Image 17: An example of how to execute guidelines 1.1, 1.2 and 2.2.

Image 18: An example of how to execute guidelines 1.1, 1.2, 2.1, 2.2 and 2.3.

5.5.1 Goals for inclusionary spaces

Goal 1: Create a space that accommodates various activities happening simultaneously around one another.

> *Guideline 1.1:* Mix of tabling and chair size, type, material, and color can accommodate any number of people, from those studying alone to those meeting in a large group.

> *Guideline 1.2:* Use landscaping or tensile screening to create spaces in which users feel they have solitary spaces for studying alone or relaxing.

Goal 2: Create a visually appealing and inviting space.

> *Guideline 2.1:* Use landscaping and tensile objects to break up a space and provide mystery.

> *Guideline 2.2:* Locate in areas that would partially enclose the space to provide a sense of security and relief from the built environment.

> *Guideline 2.3:* Mix of sun and shade.

6.0 CONCLUSION

Although research on how to adequately plan for outdoor educational and social environments on university campuses is not thorough, the foundational principles to follow when designing such a space are quite fleshed out. this research however, must include the needs and desires of the students who will be utilizing these spaces to enhance their success in the pursuit of their individual degrees.

Planners and architects must move beyond what simply looks good, and feel right for a space. The use of behavioral setting cues, through innovative use of urban furniture, landscaping, and the surrounding environment can all be used to effectively create a space to be exactly what it is intended for. Through the research provided in this report, there are several key takeaways for designers looking to implement such a space. The design attributes that were almost universally supportive of any activity, as listed below, can be used to ensure even the most basic of success within a space:

> - *Flexible seating and chairs:* Students should be able to manipulate the physical space around them to create the type of environment they need, from being alone to being in a large group;
>
> - *Landscaping:* Each attribute indicated that some degree of landscaping was desired, both for natural relief from the built environment, and for shade;
>
> - *Accent colors:* No matter the environment, the use of diverse materials and colors can add an aesthetic appeal that will immediately active interest and use of a space;

Spaces on a university campus, spaces that should be intended for student success, must be designed at every stage with these desired design attributes in mind. Use of these attributes in an effective manner can create a space that sets behavioral cues throughout the environment to influence the ways in which a person behaviors within it. Through reaching out to students, and working on a trial and error basis, the technique of campus design can be perfected to fit the most dynamic of environments, and to influence the maximum amount of student success.

It is the hope of this study, that a firm understanding of how to initially explore and create these spaces has been fostered, and that excitement to work towards dynamic campus design has been incited. May all our campuses be a success case of dynamic design.

IMAGE SOURCES

1.https://clatac.wordpress.com/caul-library-and-learning-spaces-image-gallery/outdoor-casual-meeting-or-study-space/

2.https://www.thoughtco.com/uc-santa-barbara-gpa-sat-act-786674

3.http://bookpatrol.net/ruetemples-outdoor-book-spaces/ruetemple-gazebo-3/

4.http://campus.belgrano.ort.edu.ar/educaciontecnologica/destacados/850399/home/ejemplos-de-estaciones-de-carga-solar

5.https://www.pinterest.com/pin/410883165988575198/?lp=true

6.https://www.lakeforest.edu/studentlife/

7.http://mytechassets.com/public-benches/public-bench-scandinavian-design-metal-hard-wood-public-benches-uk/

8.https://www.pinterest.com/pin/656962664364337461/

9.https://uclafirstyearexperience.wordpress.com/2015/10/20/top-hidden-study-spots/

10.http://blog.hit.edu.cn/xuejun/post/268.html

11.http://www.visitphilly.com/articles/philadelphia/great-restaurants-in-historic-philadelphia/

12.http://www.lboro.ac.uk/study/undergraduate/courses/civil-engineering/

13.http://www.parkplace-dublin.com/on-site-amenities.html

14.https://thetriangle.org/opinion/get-involved-and-stay-involved/

15.https://www.google.com/search?tbs=sbi:AMhZZiu9XDY_1oppaK86E_111ZY5ePl8ntl-N3Ax24PDB-OlOEMlhJBi7r6To99Bo-hu-3LE3HabpURl40G53LnDwSjA8wk_1bLHiGoIzmC-5FLQHsETI6L3MszsBO9jVufmN1abLwV0LEz2gkN5_1BW_1T0e4w3GVAJ9ZQ2-tQLjmleelX-Au1SrLsSYZR9MsOvaNhqy2abIJb0o-g0Cdw4XJrW_1JvnMWcfM96LhOYjTwKCz3yxOJVYw-zYLDRx9FIGuEsG6j5eEyqetOSf6Ph8Q4XgA2_1gWf1y6U33TAmjfzcsZASXpDjoAdyjBZQI-5gytDMNwyrrb32BqA-SVBO3s3D4XloLyNEc8GBGsQuQ

16.http://www.dailynebraskan.com/news/new-hammock-hangout-pops-up-on-unl-campus/article_489ddc74-9e64-11e7-8e9b-6bed7ba666f7.html

17.http://www.commonspaces.harvard.edu/chairs-harvard-yard

18.https://www.ucalgary.ca/utoday/issue/2014-09-29/making-space-improved-student-experience