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The Built Landscape and Ecological Behavior: Patterns for Readdressing Environmental Thinking in Residence Hall Design

Sarah Keogh
University of Wisconsin-Milwaukee

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THE BUILT LANDSCAPE AND ECOLOGICAL BEHAVIOR:

PATTERNS FOR READDRESSING ENVIRONMENTAL THINKING IN

RESIDENCE HALL DESIGN

by

Sarah Keogh

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ABSTRACT

THE BUILT LANDSCAPE AND ECOLOGICAL BEHAVIOR: PATTERNS FOR READDRESSING
ENVIRONMENTAL THINKING IN RESIDENCE HALL DESIGN

by

Sarah Keogh

The University of Wisconsin-Milwaukee, 2018
Under the Supervision of Professor Josef Stagg, Ph.D.

This research addresses how architectural design processes and practices are implicated and/or reflected in social constructions of ecological thinking. It is generally recognized that human behaviors are affecting climate change and giving rise to a plethora of ecological issues; yet a transformation of widespread behavior has not yet followed. This raises questions. In the field of architecture, how can the built landscape function to encourage and support sustainable behavior patterns?

Looking at universities as locations that are embedded in their urban contexts and have influence both on their surrounding communities and on year after year of students who pass through, this study examines a specific instance where a university building-type can help to affect normative change. Through an examination and comparison of four residence halls in Milwaukee, Wisconsin, this dissertation examines how the built environments of these residence halls can play an active role in sustainable behavioral learning. Using a framework based on ecological behavior theories to analyze data collected from surveys and focus groups, this research tries to uncover moments in the daily life of the residence hall students where the built landscape can directly or indirectly affect sustainable behavior patterns and ecological learning. The goal of this study is to highlight the potential for architectural design to participate in the growth of students' ecological identities through the development of a series of ecological architectural design patterns.

To my wonderful mother and father.

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LIST OF ABBREVIATIONS

NEP	New Ecological Paradigm
NEP measure	New Ecological Paradigm measure
LEED	Leadership in Energy and Environmental Design
WELL	WELL Building Standard
LLC	Living Learning Community
ANOVA	Analysis of Covariance
MANOVA	Multivariate Analysis of Covariance
Tukey-Kramer HSD Test	Tukey-Kramer Honestly Significant Differences Test
Cambridge	Cambridge Commons
Riverview	Riverview Residence Hall
East	Sandburg East Residence Hall
SWN	Sandburg South, West, and North Residence Halls

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1. Introduction

It is generally recognized that due to climate change humans need to change our behavior in relation to the environment and environmental resources. The United States in particular — with only 5% of the world's population — produces 25% of the world's greenhouse gasses, uses about a quarter of the world's fossil fuel resources, and uses one third of the worlds paper.[1] However, behavioral change is not happening, at least not on a scale that will make a meaningful difference.

This dissertation is interested in examining the role the built landscape can play in the foundation of sustainable cultural identities. This study hopes to illuminate a built landscape's potential agency in the creation of an ecologically sound culture by examining the subtle and complex relationships that exist between shifting ecological identities and daily built environments. The goal of this research is to provide simple, spatial sustainability ideas that will supplement existing architectural sustainability dialogues. As David Orr discusses in *The Nature of Design: Ecology, Culture, and Human Intention,* as architects not only do we need to address issues of resource use and efficiencies, we also have a responsibility to confront the culture of everyday life. As Orr states: "…ecological design must become a kind of public pedagogy built into the structure of daily life."[2] He outlines a general need for sustainability conversations that prioritize general usefulness and everyday coherence.[3]

Current sustainability dialogues offer a wide range of interpretations and viewpoints about what sustainability is and what its goals ought to be. In "Reinterpreting Sustainable Architecture: The Place of Technology," Simon Guy and Graham Farmer overview a number of

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[1] Andrew Dobson, *Citizenship and the Environment* (New York: Oxford University Press Inc., 2003), 18; Roddy Sheer and Doug Moss, "EarthTalk: Use It and Lose It: The Outsize Effect of U.S. Consumption on the Environment," *Scientific American*, https://www.scientificamerican.com/article/american-consumption-habits (accessed January 7, 2018).

[2] David W. Orr, *The Nature of Design: Ecology, Culture, and Human Intention* (New York: Oxford University Press, 2002), 31.

[3] Orr, *The Nature of Design,* 56.

different metalogics that frame contemporary architectural sustainability discourses.[4] One metalogic is *Eco-Technic* which views technology as a mitigator of negative environmental impacts and stresses efficiencies and quantitative analysis of architectural design solutions.[5] This is the home framework of the LEED building rating system.[6] A second sustainability metalogic is *Eco-Medical* which focuses on the health of an individual as linked to a healthy environment.[7] The WELL building standard[8] fits into this category as "… a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and well-being."[9] Another framework is *Eco-Aesthetic* which looks at the metaphorical role of architecture as a source of inspiration and identification with nature.[10] Biophilic design[11] fits easily into this metalogic, but it also crosses into *Eco-Medical* by linking connections with nature to physical and psychological health.[12] These various sustainability dialogues are not mutually exclusive, for example, as the LEED program updates and expands its purview it has incorporated aspects of *Eco-Medical* and *Eco-Aesthetic* viewpoints.

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[4] Simon Guy and Graham Farmer, "Reinterpreting Sustainable Architecture: The Place of Technology," *Journal of Architectural Education* 54, no.3 (February 2001): 141.

[5] Orr, *The Nature of Design,* 142.

[6] The LEED building rating system and certification process is the most common framework for addressing sustainability in architecture. For a comprehensive overview see: U.S. Green Building Council, *LEED v4 for building Design and Construction, updated July 8, 2017* (https://www.usgbc.org/resources/leed-v4-building-design-and-construction-current-version).

[7] Orr, *The Nature of Design,* 145.

[8] The WELL building standard is a measured criteria meant to assess issues of human health and well-being in relation to built environments. For a comprehensive overview see: Charles A. Vescoso, *WELL AP Exam Preparation Guide, Second Edition* (Illinois: American Technical Publishers, 2017). Also see: https://www.wellcertified.com/en.

[9] Charles A. Vescoso, *WELL AP Exam Preparation Guide, Second Edition* (Illinois: American Technical Publishers, 2017), 12.

[10] Orr, *The Nature of Design,* 143.

[11] Biophilic design seeks to foster a reciprocal relationship between the built environment and the natural world in order to improve human experience and nature valuations. For a comprehensive overview see: Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador, *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life* (Hoboken NJ: John Wiley & Sons, Inc., 2008).

[12] Stephen R. Kellert, "Dimentions, Elements, and Attributes of Biophiloic Design," in *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, ed. Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador, (Hoboken NJ: John Wiley & Sons, Inc., 2008), 4.

While programs such as LEED and WELL have provided clear architectural strategies for confronting issues of sustainability, this clarity has occluded the need for more comprehensive strategies that could address necessary and fundamental cultural change.[13] Both Orr, and Guy and Farmer espouse a need for *Eco-Social* design approaches in which green buildings are looked at as social constructs.[14] Architecture can be viewed as formalized behavior patterns and through this lens sustainable architecture can begin to address the relationships between built landscapes, sustainable behaviors, and ecological individual and social identities. This study is not meant to sit in competition with other architectural approaches, but hopes to function as an addition to the disparate dialogues of architectural sustainability.

This dissertation explores the design of residence halls and the relationship between the residence halls' built environments and the ecological behavior patterns of the resident students. The significance of this dissertation is threefold. First, this study seeks to add to the ever-growing sustainability dialogues in the field of architecture, espousing a specific eco-social approach founded on behavioral theories. Second, this study hopes to demonstrate a methodology that uses a particular theoretical framework to expose moments in the design of university residence halls where the built environment can directly or indirectly play a role in the learning of sustainable behavior patterns and the growth of students' ecological identification. Finally, this dissertation hopes to produce simple, sustainable design ideas in the form of architectural patterns. Patterns have been proven to be an effective tool for communicating place needs and integrating design solutions into a built landscape.[15] Patterns are concrete and specific enough to function practically and are adaptable to differing design conditions. Perhaps most importantly, patterns are an effective means of exchanging spatial ideas outside of design specialties. This study hope to produce a series of sustainable spatial patterns that can support ecological behavioral learning and help to sustain ecologically responsible

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[13] William W. Braham, *Architecture and Systems Ecology: Thermodynamic Principals of Environmental Building Design, in Three Parts* (New York: Routledge, 2016), 3-7.

[14] Orr, *The Nature of Design,* 31, 56; Guy and Farmer, "Reinterpreting Sustainable Architecture," 140.

[15] Weisman, "The Place of People in Architectural Design," 169.

behaviors — useful to designers as well as to anyone who manages residence hall spaces. By framing a behavioral approach to sustainability and demonstrating that its application can produce useful outcomes, this dissertation hopes to illustrate the value of a behavioral design approach to architectural sustainability.

The theoretical framework for this research, which will be discussed in-depth in *Chapter 2*, is founded upon linking place theory and ecological behavioral theory. There are two primary behavioral theories that social-environmental researchers commonly use to study environmentally significant behaviors. This study combines the two into a single theoretical framework and ties in relevant educational theory, place theory, and community and identity theory in order to practically explore the everyday experiences of the residence halls students. For convenience, this dissertation will refer to this collection of relevant theories as "ecological behavioral theories." Ecological identity is built from routines and everyday habits, and residence halls are a place where daily behavior patterns can be learned and taught. Rooted in most residence hall studies is the assumption that residence halls function as a place where undergraduate students transition into adulthood. Residence Halls are a place where students learn how to live independently and this dissertation hopes to demonstrate through the application of the ecological behavioral theories, that there is the potential for the physical landscape of residence halls to help to encourage the growth of ecologically positive habits that relate to our current environmental issues.

This research examines the built landscapes of four residence halls and connects spatial data with data collected from survey responses and focus group discussions which sought to assess and measure the daily behaviors of the students as well as their attitudes about ecological issues and sustainable living. *Chapter 3* will overview the methods used for data collection and data analysis. By using the ecological behavioral theory as a framework to analyze and link behavioral data and spatial data, this investigation hopes to illustrate that the design of place, in this case university residence halls, can have a significant influence on the growth of an individual's ecological identity.

Chapter 4 will walk through this dissertation's findings. The discussions in this chapter will be organized into three sections based on the three theoretical realms that are tied into this study's ecological behavioral theory: community, place, and education. Each section will highlight moments when the built environment of the residence halls directly or indirectly affects the social, physical, or cognitive environments of the residence hall students in a way that can influence their ecological behaviors.

Chapter 5 revisits the dissertation's objectives and reviews the accomplishments of Chapters 2, 3, and 4.

Chapter 6 will emphasize a practical perspective and exemplify a behavioral design approach to sustainability by using this study's findings to produce a series of ecological design patterns intended to aid both architectural designers as well as anyone who manages residence hall spaces. This study aims to show that there is potential in looking at architectural design as something that can function to help promote ecological behaviors. One of the goals of this dissertation is to begin to build an ecological design language. It has been suggested that social change in pursuit of sustainability will involve the gradual permeation of ecological values and behaviors into our general population.[16] An architectural design language that fosters sustainable behaviors and ecological learning could be instrumental as a mechanism that supports this change.

The behavioral settings within a residence hall that relate to the students' ecological behaviors and ecological behavioral-learning involve a complex system of relationships that include, but are not limited to, individual and social identities, daily habits and routines, residence hall spaces and places, normative behavioral influences, as well as the students' general and specific understandings of a variety of ecological situations. This dissertation does not seek to unravel this whole complexity but instead intends to highlight specific moments

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[16] Horton, "Demonstrating Environmental Citizenship?," 146; Shin, Castellano, and Miller, "Communicating the Mission of Earth Stewardship through Green Buildings," 249.

where this dissertation's data suggests the built landscape can directly or indirectly affect the students' ecological behavioral choices.

Behavioral assumptions are built into our landscapes.[17] As Murray Silverstein and Max Jacobson describe: "[There are] a system of relationships, usually taken for granted, that gives [a] building its basic social-physical form and connects it to the rest of society."[18] This research suggests a need to readdress some basic spatial relationships that are built into most of our culture's daily environments. The built environment has the potential to influence behavioral choices, and moments within a built landscape can function to mediate ecological behavioral learning. These intercessions do not necessarily imply a complex restructuring but can be as simple as making certain actions and behavioral choices more easy, legible, visible, accessible, and/or pleasant:[19] a simple shift of priorities written onto the built landscape.

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[17] Amos Rapoport and David Canter describe how social identity is in part created through the daily use of built landscapes through a reciprocal relationship that exists between conceptions of place and conceptions of identity See: Amos Rapoport, *Culture, Architecture, and Design* (Chicago, IL: Locke Science Publishing Company, Inc., 2005), 103; David Canter, *The Psychology of Place* (London: The Architectural Press Ltd., 1977), 123. Canter discusses how cognitions of place and identity can be evocative and encourage specific patterns of behavior. See: Canter, *The Psychology of Place*, 17, 148, 150.

[18] Murray Silverstein and Max Jacobson, "Restructuring the Hidden Program: Toward an Architecture of Social Change," in *Programming the Built Environment*, ed Wolfgang F.E. Preiser (New York: Van Nostrand, 1985), 151; Gerald D. Weisman, "The Place of People in Architectural Design," in Architectural Design *Portable Handbook: A Guide to Excellent Practices*, ed. Andy Pressman (New York: McGraw-Hill, 2001), 162-163.

[19] The explanatory power of behavioral theory is greatest for low-cost (i.e. easy) behaviors: Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 4; Daniel E. Montano and Danuts Kasprzyk, "The Theory of Reasoned Action, Theory of Planned Behavior, and the Integrated Behavioral Model," in *Health Behavior and Health Education*, 4th edition, ed. Karen Glanz, Barbara K. Rimer, and Frances Marcus Lewis (San Francisco, CA: Jossey-Bass, 2008), 78; Stern, "Environmentally Significant Behavior in the Home," 373, 375, 377.
The influence of injunctive and descriptive norms: Mckenzie-Mohr, "Promoting Sustainable Behavior," 550.

2. Theoretical Framework and Literature Review

This chapter first introduces and discusses the concept of ecological identity as well as a number of related terms, specifically outlining shifting conceptions of citizenship and defining the new ecological paradigm. Next, this chapter delineates two behavioral theory frameworks that can apply to the study of ecological behaviors. An argument is made that a combined framework made up of these two behavioral models is appropriate for this study. Educational theory is tied into the Ecological Behavioral Framework, specifically pulling from theories of situated cognition and communities-of-practice. This chapter then discusses place theories that are relevant to this study, particularly tying in the concept of behavior settings and normative theories of place into the behavioral framework. Next, this study looks at community and identity theories and discusses how influences on social and individual identities connect into the ecological behavioral framework, particularly addressing social diffusion and social normative influence. Finally, this chapter addresses current trends in sustainable residence hall design and highlights a lack a behavioral approach to studies that address issues of sustainability in residence halls.

2.1. Ecological Identity and the New Ecological Paradigm

This section first introduces and discusses the concept of ecological identity. Then a number of terms that directly relate to sustainable behaviors are defined: including ecological footprint, environmentally significant behaviors, and ecological behaviors. Finally, a shifting conception of citizenship in relation to the environment is addressed, outlining the differences between traditional citizenship and a new ecological paradigm.

In order to address how the built landscape can help students to build an ecological identity, one must first address how this study defines an *ecological identity*. The idea of ecological identity in this research is founded upon the concept of an *ecological citizen*.

Ecological citizenship as defined by Andrew Dobson in *Citizenship and the Environment* is fundamentally an anthropocentric notion in which there is a recognition that human behaviors are affecting global changes to our environment.[20] Ecological citizens are characterized by three primary qualities: First, they recognize that their actions, private actions as well as public actions, affect others. Second, ecological citizens recognize that their daily habits of consumption and waste have both ecological and social consequences that can span globally as well as extend into the future. Third, ecological citizens feel an obligation to minimize their negative ecological impact.[21] An ecological identity in this inquiry is defined by the extent to which the students in this study align and identify with the ecological beliefs and values of ecological citizenship.

Ecological Identity ⟷ Ecological Citizenship
        ↗
            Environmentally Significant Behaviors ··· (Daily Habits)
            Ecological Footprint ---------------------------- (Responsibility)
            Ecological Behaviors ------------------------------- (Awareness)
        ↗
New Ecological Paradigm (NEP)
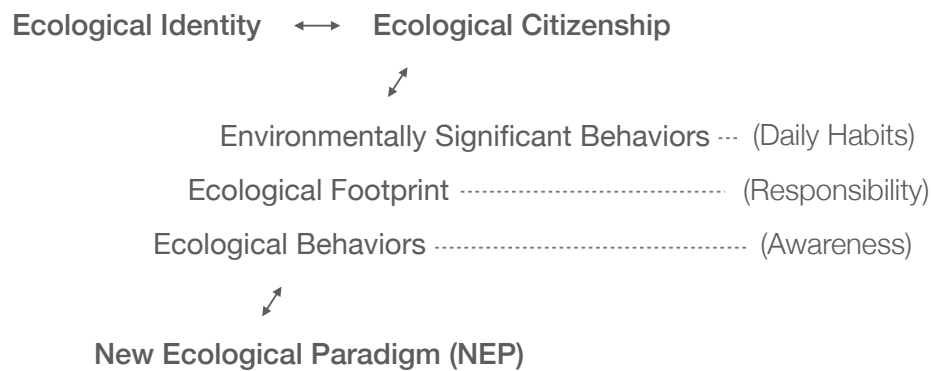
Figure 1. Ecological Identity and Ecological Citizenship.
Adapted from a discussion of citizenship by Andrew Dobson.
Source: Andrew Dobson, *Citizenship and the Environment* (New York: Oxford University Press Inc., 2003), 81; 99-100; 105-106, 111, 119.

There are a number of terms that relate to ecological identity that must also be defined for the purpose of this research. The obligation of an ecological citizen is best expressed through the idea of an ***ecological footprint*** in which individual and group behaviors are seen as having the capacity to impose themselves locally and globally. Produced through habits of

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[20] Dobson, *Citizenship and the Environment*, 111; US Global Change Research Program, "Climate Science Special Report (CSSR)," under "Read the Draft of the Climate Change Report," https://www.nytimes.com/interactive/2017/08/07/climate/document-Draft-of-the-Climate-Science-Special-Report.html (accessed June 24, 2017): 26.

[21] Sverker C. Jagers, "In Search of the Ecological Citizen," *Environmental Politics* 18, no.1 (February 2009): 19-20.

consumption and waste, the implications of human behaviors are seen as extending not only globally but also temporally and have the potential to limit the options of future generations of people. Someone who claims an ecological identity strives to ensure that their ecological footprint makes a sustainable, rather than an unsustainable, impact.[22]

   Current environmental thinking postulates that progress towards sustainability can be achieved through incremental shifts in everyday personal behaviors. Ecological footprints reflect the impact of the production and reproduction of daily lives.[23] Individual consumption habits, including shopping, resource consumption, and choices of transportation, as well as waste and recycling habits, all play a significant role. These types of behaviors are called *environmentally significant behaviors* and are defined by the extent to which an action changes the availability of materials and resources in the environment.[24] The community of ecological citizenship is created by the material activities of each member and is all about everyday living, everyday activities.[25] Ecological citizens are committed to minimizing their negative ecological footprint and therefore recognize everyday, local activities as sites of potential change.[26] Changing individual behaviors to a more ecologically sound pattern by focusing on environmentally significant behaviors is central to achieving a sustainable future and someone with a strong ecological identity recognizes and accepts that these shifts are their personal responsibility and acts by paying attention and maintaining sustainable habits in their daily life.[27]

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[22] Dobson, *Citizenship and the Environment,* 81; 99-100; 105-106, 119.

[23] Ibid., 119.

[24] Paul C. Stern, "Environmentally Significant Behavior in the Home," in *The Cambridge Handbook of Psychology and Economic Behavior*, ed. Alan Lewis (New York: Cambridge University Press, 2008): 371.

[25] Dobson, *Citizenship and the Environment*, 110, 138.

[26] Ibid., 102, 281.

[27] Dobson, *Citizenship and the Environment,* 135; Dave Horton, "Demonstrating Environmental Citizenship? A Study of Everyday Life Among Green Activists," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 127; Doug Mckenzie-Mohr, "Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing," *Journal of Social Issues* 56, no.3 (2000): 544.

The term *ecological behaviors* also deserves definition. According to behavioral researchers, there are three groups of ecological behaviors. The first is defined as consumption behaviors, which equates to environmentally significant behaviors as described in the preceding paragraph. The second group of ecological behaviors involves a willingness to make personal sacrifices for the benefit of the environment, for example, paying higher taxes that go towards reducing pollution or choosing a vacation that does not require air travel. The third group of ecological behaviors is defined through active participation in environmentally beneficial activities, for example, signing petitions or donating money to pro-environmental causes, or participating in a river-clean-up group.[28] A general shift to a citizenship that embraces these behaviors is necessary in order to build communities that can support a sustainable future.

Someone with an *ecological identity* commits to the values and beliefs of an *ecological citizen*; is cognizant of how their actions impact local and global resources (*ecological footprint*); actively seeks to make sure that their daily behaviors are environmentally sustainable (*environmentally significant behaviors*); and strives to further an environmentally sound culture through practices in both their private and public life (*ecological behaviors*).

Ecological thinking has begun to cause a paradigm shift which has impacted our conception of citizenship. For the last few centuries, citizenship in our culture has tended to view nature and the environment through the lens of economics wherein value stems from use towards economic growth. Social compassion is traditionally held only for those near and dear. Social psychologists call this the Dominant Social Paradigm. The New Ecological Paradigm (NEP) shifts these dominant perceptions and includes first, a recognition that our health and wellbeing is linked to and dependent on nature; and second, an assumption of responsibility to

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[28] Maria del Carmen Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior," *Journal of Applied Social Psychology* 42, no.11 (2012): 2802.

present and future generations for the health of a global environment.[29] These New Ecological Paradigm convictions are a core element in environmental belief systems, and therefore align with an ecological identity.[30]

This paradigm shift has affected our understanding of citizenship in three significant ways. First, environmental concerns are included in citizenship "rights." Second, there is an enhanced global awareness which has expanded the scope of citizenship. Finally, ecological concerns have added complexity to the responsibilities associated with citizenship.[31]

Dominant Social Paradigm	New Ecological Paradigm
Citizenship Rights	Citizenship Obligations
Traditional Political Borders	Non-Territorial Global Responsibilities
Public Actions	Private and Public Actions
Rights-Based Citizenship	Virtue-Based Citizenship
↓	↓
Traditional Citizenship	Ecological Citizenship

Figure 2. Citizenship Distinctions - the Dominant Social Paradigm and the New Ecological Paradigm.
Adapted from a Types of Citizenship table by Andrew Dobson.
Source: Andrew Dobson, *Citizenship and the Environment* (New York: Oxford University Press Inc., 2003), 39.

The difference between ecological citizenship (which Andrew Dobson calls post-cosmopolitian citizenship) and the dominant contemporary view of citizenship can be illuminated through four contrasts (Figure 2). The first contrast has to do with citizenship rights

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[29] Simon Matti, *The Imagined Environmental Citizen. Exploring State - Individual Relationships in Swedish Environmental Policy,* (Licentiate Thesis, Lulea University of Technology, 2006), 65; Paul C. Stern, Thomas Dietz, and Gregory A. Guagnano, "The New Ecological Paradigm in Social-Psychological Context," *Environment and Behavior* 27, no.6 (November 1995): 725; Dobson, *Citizenship and the Environment,* 39.

[30] Riley A. Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale," *Journal of Social Issues* 56, no.3 (2000): 428.

[31] Dobson, *Citizenship and the Environment*, 83.

versus citizenship obligations. An ecological citizen recognizes that self-interested behavior is not always in the best interest of the community and is committed to the common good. Second, ecological citizenship is non-territorial. An ecological citizen recognizes that rights and responsibilities transcend traditional social and political boundaries. Rights are universal and responsibilities extend globally. Third, in the contemporary dominant citizenship paradigm, citizenship activities happen primarily in the public realm. Ecological citizens however, understand that private actions have public implications. They recognize that the private arena — daily life, household habits — is also a site of citizenship activity. Finally, ecological citizens view citizenship as virtue based. Unlike contemporary citizenship, which is based on ideas of reciprocity, ecological citizens understand that citizenship entails duties instead of entitlements. They recognize how their actions affect others and look to strengthen the horizontal relationships between citizens as opposed to focusing on vertical relationships that have to do with a citizen and their state.[32]

The objective of a person with an ecological identity is environmental sustainability.[33] Many citizens in the United States claim that they believe in environmental sustainability, however evidence suggests that sustainable behaviors are not becoming a social or political norm. The significant factor that differentiates someone with an ecological identity from someone who is simply environmentally aware is a "willingness to act." A person with an ecological identity acts upon environmental obligations which they see as their personal responsibility and do this because they are morally committed to environmental values, not because of incentives or reasons of immediate personal gain.[34] Ecological citizenship is rooted in social values that prioritize collective versus individual considerations.[35] Someone with an ecological identity

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[32] Dobson, *Citizenship and the Environment*, 5, 37, 39, 116, 280; Matti, *The Imagined Environmental Citizen,* 64-65; Sverker C. Jagers, Johan Martinsson, and Simon Matti, "The Environmental Psychology of the Ecological Citizen: Comparing Competing Models of Pro-Environmental Behavior," *Social Science Quarterly* (2016): 2.

[33] Dobson, *Citizenship and the Environment,* 175.

[34] Jagers, "In Search of the Ecological Citizen," 18; Dobson, *Citizenship and the Environment,* 175.

[35] Tommy Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," *Journal of Environmental Psychology* 23 (2003): 2; Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 8.

maintains an awareness of how their day-to-day lives affect others and holds a moral

obligation to amend any unsustainable effects.[36] This willingness to act is something that can

be learned and taught; and this study argues that the built landscape can play a role in this

learning process.

Studies have shown that age and education are major factors that affect whether a person

identifies within the New Ecological Paradigm. Though there are exceptions, most studies find

that the New Ecological Paradigm is negatively correlated to age and positively correlated to

education. Young people who are exposed to ecological thinking are more likely to embrace

the beliefs and behaviors of an ecological identity. Residence halls, which house groups of

young adults who are living independently for the first time and starting a university education,

pose a great opportunity to increase awareness about environmental issues and inculcate new

ecologically responsible citizens.[37]

Within the New Ecological Paradigm, the behaviors of an ecological citizen are rooted in

commitments that must extend past specific incentives or disincentives. Environmental change

is dependent on a change in our conceptual systems — how we relate to and act within our

environment.[38] When addressing ecological behavioral theory, this is a problem with rational

behavior models. Environmental behaviors do not simply stem from an increase in sustainable

knowledge, nor do long-term behaviors stem from the reciprocity of incentive programs which

offer immediate benefits for specifically defined actions. Sustainable behavior patterns develop

from a complex set of variables rooted in ecological values, beliefs, and attitudes — aided by

knowledge and place opportunities; all of which can be addressed through human behavioral

theory.[39]

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[36] Dobson, *Citizenship and the Environment,* 5.

[37] Riley A. Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale," *Journal of Social Issues* 56, no.3 (2000): 429; Jagers, "In Search of the Ecological Citizen," 32.

[38] Canter, *The Psychology of Place*, 156.

[39] Dobson, *Citizenship and the Environment,* 4.

2.2. Behavioral Theory

This section first describes theories of behavioral reasoning and behavioral influences. Then two behavioral theory frameworks that can apply to ecological behaviors are outlined and examined: first, the Theory of Planned Behavior, and then the Value-Belief-Norm theory. The strengths and weakness of both models are discussed and, finally, an argument is made for using a combined behavioral theory model for this study.

Evidence suggests human thinking is the product of two systems of reasoning. The first system is rational and deliberate, conscious and rule-based. This type of reasoning is slow, thoughtful, and based on perceived facts. The second system of reasoning is associative, unconscious and sensory-driven. This type of reasoning is quick, intuitive, and can work well in an information deficit.[40] Though most human decisions seem thoughtful and deliberate, it is acknowledged that the associative system of reasoning plays a powerful role in all actions and can influence or even override rational decisions.[41] When addressing environmentally sustainable behaviors this associative system of reasoning can be problematic because though the knowledge may exist of why a sustainable action may be preferable, actions influenced by unconscious and intuitive reasoning may not necessarily follow a sustainable logic.

In behavioral theory there are four classifications of ecological behavioral influence (Figure 3). The first is Contextual Factors which includes variables such as social norms and expectations, the built environment and convenience, and available technology. The second classification is Personal Capabilities. This involves personal limitations (resources, finances, etc), behavior-specific knowledge, and skills. The third is Habits and Routines which includes subconscious tendencies and instincts based on previous experience. The final classification

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[40] Steven A. Sloman, "Two Systems of Reasoning," in *Heuristics and Biases: The Psychology of Intuitive Judgment*, ed. Thomas Gilovich, Dale Griffin, and Daniel Kahneman (New York: Cambridge University Press, 2002), 379-384; Malcolm Gladwell, *Blink: The Power of Thinking Without Thinking* (New York: Little, Brown and Company, 2005), 12.

[41] Christie Manning, *The Psychology of Sustainable Behavior* (Saint Paul, MN: Minnesota Pollution Control Agency, 2009), 3; Sloman, "Two Systems of Reasoning," 380.

of behavioral influence is Attitudinal Factors which addresses values, behavior-specific norms, attitudes, and perceived cost-benefits.[42] While some of these factors would seem to involve rational thought, many belong to the associative system of reasoning: social norms, convenience, subconscious tendencies, instinct based on previous experience, and behavior-specific norms; many of which may not conventionally lend to sustainable types of behaviors.

Ecological Behavioral Influence

Contextual Factors	Social Norms and Expectations Convenience Available Technology
Personal Capabilities	Personal Limitations Behavior-Specific Knowledge Skills
Habit and Routines	Subconscious Tendencies Instincts Previous Experience
Attitudinal Factors	Values Behavior-Specific Norms Attitudes Perceived Cost-Benefit

Figure 3. Classifications of Ecological Behavioral Influence.
Adapted from a description and table of influences on environmentally significant behavior by Paul C. Stern.
Source: Paul C. Stern, "Understanding Individuals' Environmentally Significant Behavior," *Environmental Law Reporter* 35 (2005): 10786.

There are a numerous theoretical behavioral models that are used to attempt to explain human behaviors. However, when addressing environmentally significant behaviors, social-environmental researchers tend to use one of two major behavioral frameworks: the Value-Belief-Norm Theory or the Theory of Planned Behavior.[43] The Theory of Planned Behavior is premised on the idea that behavior is primarily guided by self-interested concerns. The Theory

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[42] Paul C. Stern, "Understanding Individuals' Environmentally Significant Behavior," *Environmental Law Reporter* 35 (2005): 10786.

[43] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2798; Icek Ajzen, "Theory of Planned Behavior," *Organizational Behavior and Human Decision Process* 50 (1991): 179; Paul C. Stern, "Toward a Coherent Theory of Environmentally Significant Behavior," *Journal of Social Issues* 56, no.3 (2000): 413.

of Planned Behavior is an extension of the Theory of Reasoned Action and is a rational choice model of behavior. The Value-Belief-Norm Theory on the other hand, is based on the assumption that human behaviors stem from social values. These values act as antecedents to worldview and thus as a filter for beliefs and attitudes; which in turn guide behaviors.[44] To build a theoretical model that can link sustainable behavioral-learning to elements of a built landscape, which is the goal of this study, a thorough examination of both theories is necessary.

The Theory of Planned Behavior (Figure 4) suggests that there are three factors that prefigure behavioral intent, and therefore guide behavior. The first, Attitude Toward Behavior, involves the perceived probability or personal belief that an action will produce a certain outcome. This component of the model is formed from a learned predisposition to respond to a situation in a certain way and is primarily influenced by past experience. Subjective Norms are comprised of the expectations produced by others in a social group. This element of the behavioral model is determined by a person's belief that the people who are important to them will respond favorably to their intended behavior. The third factor that predetermines behavioral intent is Perceived Behavioral Control which involves a person's perception about the possibility of performing an action. This is comprised of impressions about how easy it would be to perform an action and whether there are any physical obstacles to performing a behavior, stemming either from one's own capabilities or specific situations within the built landscape.[45]

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[44] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2797; Sebastian Bamberg, Marcel Hünecke, and Anke Blobaum, "Social Context, Personal Norms and the Use of Public Transportation: Two Field Studies," *Journal of Environmental Psychology* 27 (2007): 190.

[45] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2800; Ajzen, "Theory of Planned Behavior," 181; Lisa Beck and Icek Ajzen, "Predicting Dishonest Actions Using the Theory of Planned Behavior," *Journal of Research in Personality* 25 (1991): 287.

Theory of Planned Behavior
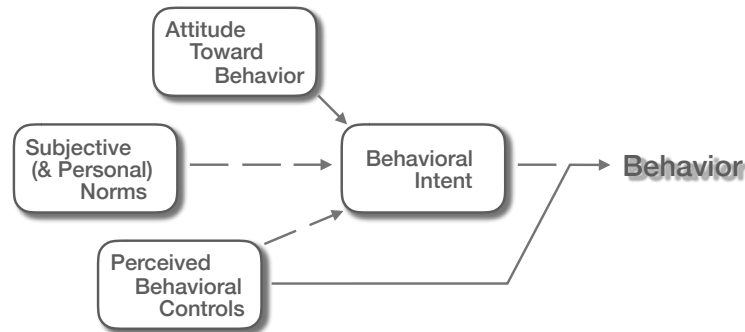
Figure 4. Theory of Planned Behavior.
Adapted from a diagram and descriptions of the Theory of Planned Behavior from Maria del Carmen Aguilar-Luzon et al.; and Lisa Beck and Icek Ajzen.
Source: Maria del Carmen Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief- Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior," *Journal of Applied Social Psychology* 42, no.11 (2012): 2800; Lisa Beck and Icek Ajzen, "Predicting Dishonest Actions Using the Theory of Planned Behavior," *Journal of Research in Personality* 25 (1991): 287.

There have been issues successfully applying the Theory of Planned Behavior when addressing pro-environmental behaviors because individual feelings of obligation toward pro-environmental actions are not accounted for in the theory's framework. In an attempt to more successfully study sustainable behaviors, some researchers have modified what was originally the Subjective Norms component to include not only social mores, but also the effect of internalized, personal values on an individual's perception of what is normal and preferable behavior.[46] Therefore the framework for this study includes both and is labeled Subjective & Personal Norms.

In the Theory of Planned Behavior model, of the antecedents to Behavioral Intent the Attitude Toward Behavior component contributes the most influence; Perceived Behavioral Controls contributes as a close second; and Subjective Norms affect Behavioral Intent the

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[46] Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," 1.

least.[47] However, Perceived Behavioral Controls is the most significant direct antecedent to

Behavior. Not only does a person's perception of their ability to perform a behavior influence

Behavioral Intent, if an action seems too difficult or unachievable this perception will override

all other considerations, deliberate and associative, and directly affect the behavioral outcome.

In studies that address pro-environmental behaviors, Perceived Behavioral Controls has been

shown to affect behavioral outcomes with a greater degree of fit than Behavioral Intent.[48] Some

social-behavioral researchers suggest that the Theory of Planned Behavior may not apply

directly to environmentally significant behaviors because personal norms seem to play an

important role in predicting pro-environmental behaviors, and the Norms component of this

model has been shown to be the least significant predictive component.[49]

The Value-Belief-Norm Theory of behavior (Figure 5) is premised on the idea that social

values guide behaviors. According to this behavioral model, behaviors are undertaken as a

response to a personal norm or moral obligation to perform a behavior. These norms are

formed as a result of a certain awareness or concern about a situation that leads to a sense of

responsibility to act. The Awareness of Consequences component of this model is guided by

personal value priorities and an awareness that a situation poses a negative consequence to

someone or something within that value set. The Ascription of Responsibility factor results from

a belief that one can and should act in order to alleviate that negative consequence. Personal

and Social Norms are founded on the obligations that emerge from these belief sets and

directly produce a behavioral outcome.[50]

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[47] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2814.

[48] Charlie Wilson and Hadi Dowlatabadi, "Models of Decision Making and Residential Energy Use," *Annual Review of Environmental Resources* 32 (2007): 184; Pamela-Jean N. Driza, "Optimal Building Performance: Exploring Human Behavior Impacts on Energy and Water Consumption in Campus Residence Halls," (PhD diss., University of Florida, 2014), 56.

[49] Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," 1.

[50] Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 3; Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," 1.

Value-Belief-Norm Theory
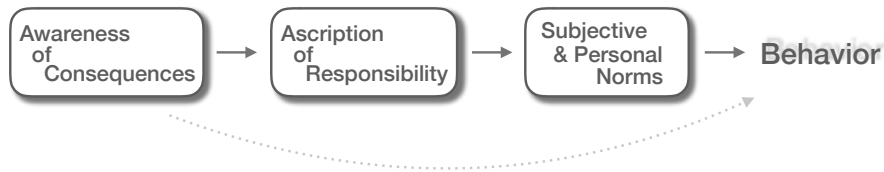
Figure 5. Value-Belief-Norm Theory.
Adapted from descriptions of the Value-Belief-Norm theory from Sverker C. Jagers; and Tommy Garling et al.
Source: Sverker C. Jagers, "In Search of the Ecological Citizen," *Environmental Politics* 18, no.1 (February 2009): 7; Tommy Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," *Journal of Environmental Psychology* 23 (2003): 2.

One of the defining factors that distinguishes an ecological citizen is their willingness to act upon environmental obligations that they see as their personal responsibility due to a commitment to environmental values. These three factors are akin to the Value-Belief-Norm theory's components Awareness of Consequences, Ascription of Responsibility, and Personal Norms; and one would expect to see a strong correlation between ecological citizenship and the Value-Belief-Norm Theory. Also ecological citizenship is rooted in a universal concern for others and the environment, which suggests that a behavioral theory based on social values should provide a goodness of fit.[51]

Values associated with the New Ecological Paradigm can be grouped into three categories: biospheric values, social values, and egocentric values. It has been concluded by many behavioral theorists that these value sets are indistinguishable from the Awareness of Consequences metric in the Value-Belief-Norm theory. An expanded Value-Belief-Norm theory framework which accounts for these three distinct categories (Figure 6) has been shown to

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[51] Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 8.

increase the model's ability to capture connections that explain pro-environmental behaviors and together can make a single reliable scale.[52]

New Ecological Paradigm + Value-Belief-Norm Theory
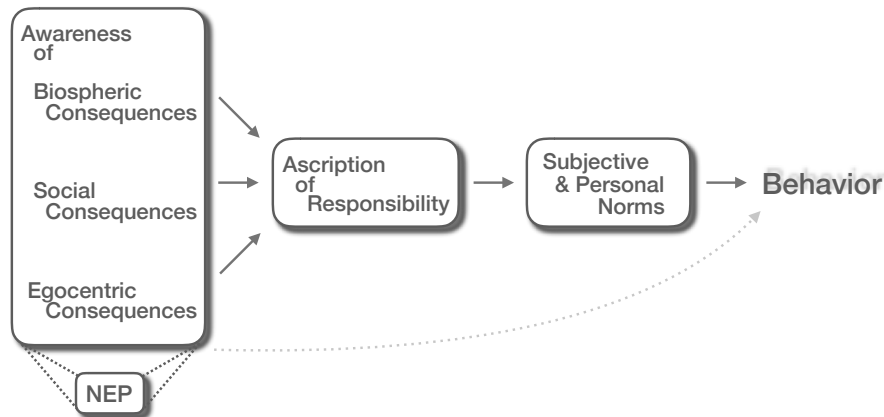
Figure 6. The New Ecological Paradigm and the Value-Belief-Norm Theory.
Adapted from a Components of the Value-Belief-Norm theory diagram by Maria del Carmen Aguilar-Luzon et al.; and a Hypothesized Structural Model diagram by Tommy Garling et al.
Source: Maria del Carmen Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief- Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior," *Journal of Applied Social Psychology* 42, no.11 (2012): 2801; Tommy Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," *Journal of Environmental Psychology* 23 (2003): 2.

Another reason that researchers expect the Value-Belief-Norm theory to correlate well with ecological behavior study is that values tend to act as an underlying guide to behavior, including the formation of attitudes in unfamiliar conditions. It is also believed that values are more stable than attitudes; all of which suggest that the Value-Belief-Norm model of behavior should have better explanatory power than the Theory of Planned Behavior when addressing ecological behaviors.[53]

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[52] Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," 2-4; Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 12; Stern, Dietz, and Guagnano, "The New Ecological Paradigm in Social-Psychological Context," 736.

[53] Paul C. Stern et al., "Values, Beliefs, and Proenvironmental Action: Attitude Formation Toward Emergent Attitude Objects," *Journal of Applied Social Psychology* 25, no.18 (1995): 1615.

However, there are two major reasons that researchers choose to use the Theory of Planned Behavior instead of the Value-Belief-Norm theory when studying ecological behaviors. The first is that studies have shown that the most significant variable in the Value-Belief-Norm model is an awareness of environmental threat; the higher the Awareness of Consequences metric, the greater the willingness to act.[54] But in the model Norms are the only variable that directly affects behavior, which suggests that this model may lack a necessary variable relationship.[55] The second issue with the Value-Belief-Norm theory is that the public and private component of the ecological citizenship definition doesn't correlate clearly to any of the Value-Belief-Norm model's variables. It has been suggested that extensive further research is needed in order to develop an expanded Value-Belief-Norm framework that can account for both public and private behavioral arenas' influence on ecological behaviors.[56]

A third issue that this study faces with the Value-Belief-Norm model is that there is no element that can directly relate to the influence of the built landscape on behavioral outcomes. From the perspective of an architectural study, this is the primary reason that the Value-Belief-Norm theory cannot be the sole theoretical framework for this exploration.

Though the Theory of Planned Behavior is a general behavioral model, it has been shown to have a good capacity to predict ecological behaviors. In fact, many studies have demonstrated that the Theory of Planned Behavior has a greater capacity than the Value-Belief-Norm model.[57] Even with the New Ecological Paradigm's values added to the Value-Belief-Norm model's Awareness of Consequences metric, the Theory of Planned Behavior still shows a better goodness of fit when addressing ecological behaviors.[58] The Theory of Planned Behavior also has the capability of directly addressing the built landscape in its construct

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[54] Jagers, "In Search of the Ecological Citizen," 31.

[55] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2801.

[56] Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 13.

[57] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2797, 2817.

[58] Ibid., 2812.

through the Perceived Behavioral Controls variable.

Schematic Model of Environmental Concern
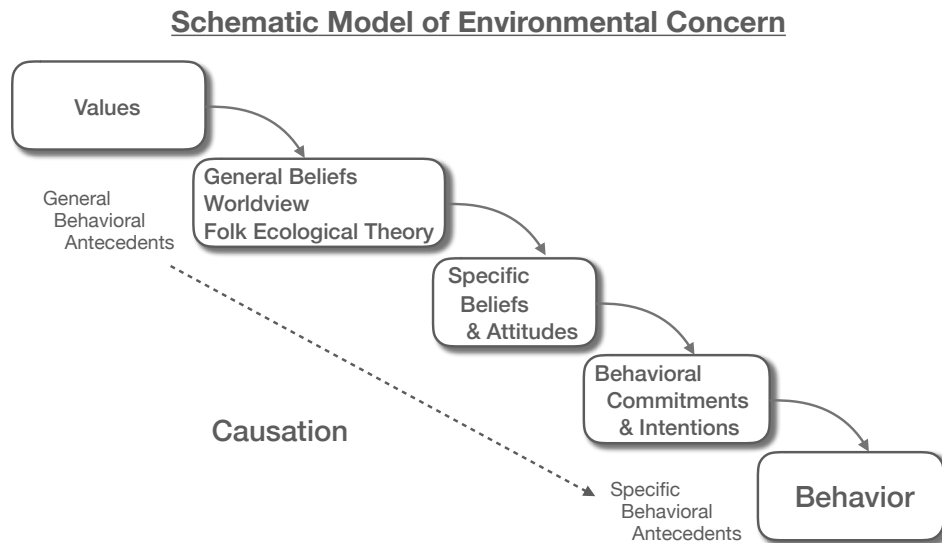
Figure 7. Schematic Model of Environmental Concern.
Adapted from a Schematic Causation Model of Environmental Concern diagram by Paul C. Stern.
Source: Paul C. Stern, "Understanding Individuals' Environmentally Significant Behavior," *Environmental Law Reporter* 35 (2005): 727.

Most social-environmental researchers tend to use one of these two behavioral frameworks, however, the Theory of Planned Behavior and the Value-Belief-Norm theories are not unrelated and a research project does not necessarily have to choose one or the other as a model. A Schematic Causation Model of Environmental Concern (Figure 7) shows that values and worldview are casually antecedent to more specific beliefs and attitudes; which in turn are precursors to behavioral norms and intentions: all of which function as constituents of ecological behavioral outcomes.[59] Looking at the variables that make up the Value-Belief-Norm theory and the Theory of Planned Behavior through this lens, one can see that these two behavioral models are not mutually exclusive but instead can function to support one another in explaining and predicting ecological behaviors (Figure 8). In a combined model, the

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[59] Stern, Dietz, and Guagnano, "The New Ecological Paradigm in Social-Psychological Context," 726-727.

Schematic Model of Environmental Concern
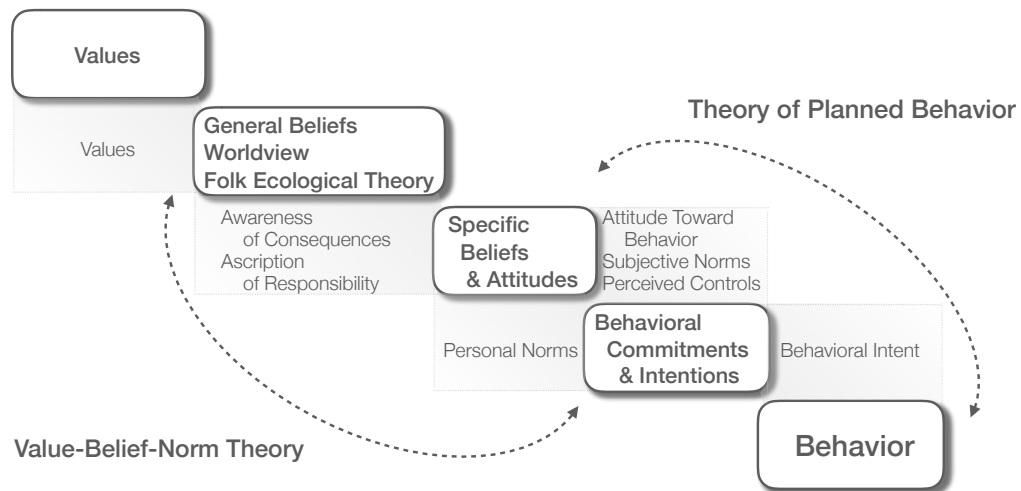
Figure 8. Behavioral Theory and the Schematic Model of Environmental Concern.
Schematic representation adapted from constructs from a Schematic Causation Model of Environmental Concern diagram by Paul C. Stern; Components of the Value-Belief-Norm theory diagram by Maria del Carmen Aguilar-Luzon et al.; and a Hypothesized Structural Model diagram by Tommy Garling et al.; and descriptions of the Value-Belief-Norm theory from Sverker C. Jagers; and Tommy Garling et al.
Source: Paul C. Stern, "Understanding Individuals' Environmentally Significant Behavior," *Environmental Law Reporter* 35 (2005): 727; Maria del Carmen Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief- Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior," *Journal of Applied Social Psychology* 42, no.11 (2012): 2801; Tommy Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," *Journal of Environmental Psychology* 23 (2003): 2; Sverker C. Jagers, "In Search of the Ecological Citizen," *Environmental Politics* 18, no.1 (February 2009): 7; Tommy Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," *Journal of Environmental Psychology* 23 (2003): 2.

Value-Belief-Norm theory addresses the social values and moral obligations of ecological

citizenship which then supports the more specific behavioral causation framework of the

Theory of Planned Behavior model (Figure 9). There are multiple studies that show that the

predictive power of these models increase significantly when the components from both are

included in the theoretical framework.[60]

This dissertation seeks to connect the values, general beliefs, and attitudes of an ecological

citizen to the more specific social and physical settings of university residence halls, and will

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[60] Mckenzie-Mohr, "Promoting Sustainable Behavior," 74-75; Driza, "Optimal Building Performance," 53-61.

therefore use the combined Value-Belief-Norm theory and Theory of Planned Behavior model. This theoretical model, designed as a framework to explore the complex system of variables that can affect ecological behavioral outcomes, will be referred to as the Ecological Behavioral Framework throughout the rest of this dissertation.

In order to more fully investigate the cognitive, social, and physical landscapes that relate directly and indirectly to ecological behaviors, the next sections of this chapter will tie educational theories, place theories, and community and identity theories into the Ecological Behavioral Framework.

Value, Belief, Norm Theory + Theory of Planned Behavior
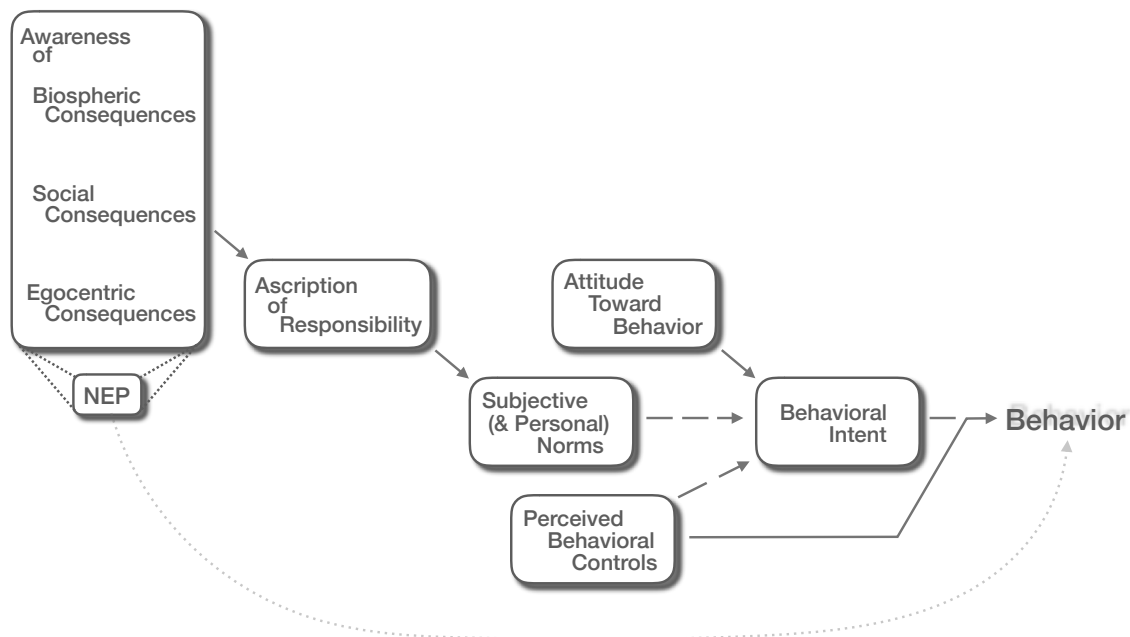
Figure 9. Combined Value-Belief-Norm Theory and Theory of Planned Behavior Model.
Theoretical framework adapted from a description by Doug Mckenzie-Mohr and a description and diagram by Pamela-Jean N. Driza.
Source: Pamela-Jean N. Driza, "Optimal Building Performance: Exploring Human Behavior Impacts on Energy and Water Consumption in Campus Residence Halls," (PhD diss., University of Florida, 2014), 53-61; Doug Mckenzie-Mohr, *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing*, 3rd ed. (Gabriela Island, BC: New Society Publishers, 2011) 74-75.

2.3. Educational Theory

This section first addresses the link between education and the qualities of an ecological citizen. Then shortcomings in current environmental initiatives are outlined. Educational ideas pulled from theories of situated cognition, communities-of-practice, and behavior settings are discussed in relation to this study. And finally, university residence hall life is presented as a potential moment for ecological learning, and the relationships between relevant educational theory and the Ecological Behavioral Theory Framework for this study are highlighted.

Ecological Behavioral Framework

Education

Awareness
of

Biospheric
Consequences

Social
Consequences

Egocentric
Consequences

NEP

Ascription
of
Responsibility

Attitude
Toward
Behavior

Community

Situated Cognition

Community
Knowledge

Subjective
(& Personal)
Norms

Behavioral
Intent

Behavior

Perceived
Behavioral
Controls

Place
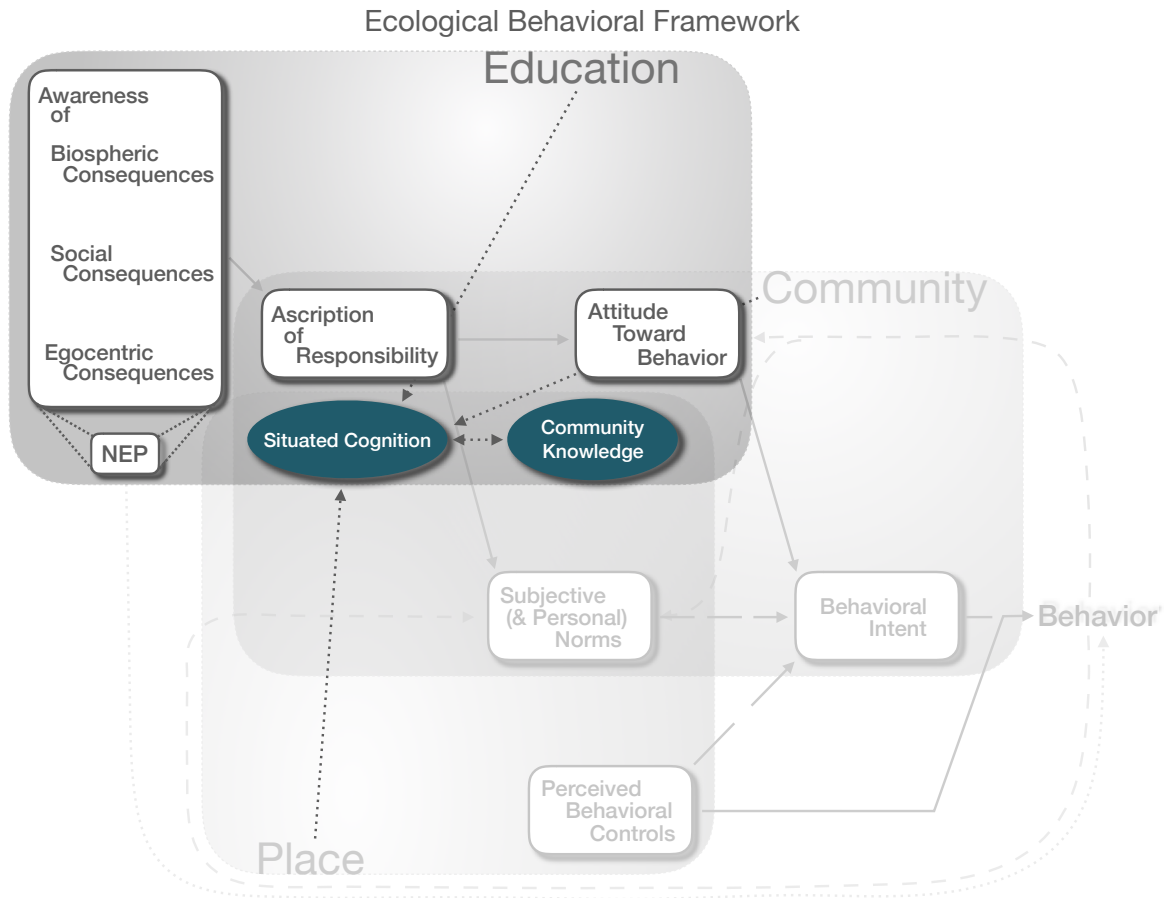
Figure 10. Education in the Ecological Behavioral Framework.
Adapted from Figure 8 and ecological education theory from Paul C. Stern, Thomas Dietz, Linda Kalof, and
Gregory A. Guagnano; Riley A. Dunlap, Riley A., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones;
and Andrew Dobson.
Source: Paul C. Stern et al., "Values, Beliefs, and Proenvironmental Action: Attitude Formation Toward Emergent
Attitude Objects," *Journal of Applied Social Psychology* 25, no.18 (1995): 1613-1614; Paul C. Stern, Thomas Dietz,
and Gregory A. Guagnano, "The New Ecological Paradigm in Social-Psychological Context," *Environment and
Behavior* 27, no.6 (November 1995): 726; Riley A. Dunlap et al., "Measuring Endorsement of the New Ecological
Paradigm: A Revised NEP Scale," *Journal of Social Issues* 56, no.3 (2000): 437; Andrew Dobson, *Citizenship and
the Environment* (New York: Oxford University Press Inc., 2003), 181.

Education has been shown to be essential to the development of positive sustainable

attitudes. Studies have a verified that ecological citizenship is positively correlated with

education, and that the higher the education level, the greater a person's willingness to act.[61]

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[61] Jagers, "In Search of the Ecological Citizen," 27, 32.

This suggests that universities are an environment rich with the potential to help forward a change in environmental attitudes and behaviors.

Currently there are two primary shortcomings in environmental initiatives. First, most environmental initiatives are based on incentive programs, and incentive programs don't work to shift behavioral norms. Instead of helping to affect a necessary change in values and attitudes, they reinforce a citizenship culture based on reciprocity wherein there is an immediate personal reward gained from a single type of action.[62] Second, environmental initiatives typically seek to create new institutional structures rather than using existing and accepted community and social mechanisms.[63] Universities are an ideal place to forward environmental programs. They are preexisting systems, embedded in local communities, with the ability to influence the growth of positive sustainable attitudes.

The second most common type of environmental initiative seeks to increase environmental knowledge and awareness. Studies show that that simply supplying information and knowledge out-of-context is not enough to forward environmental attitudes. Abstract principles can be difficult understand and seen as unrelated when the information is separated from its use in the world.[64] Environmental knowledge needs to exists in a context which gives it meaning. It needs to be embedded in order to inculcate frames of mind, habits, and behaviors.

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[62] Andrew Dobson and Derek Bell, "Introduction," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006): 3.

[63] David Uzzell, Enric Pol, and David Badenas, "Place Identification, Social Cohesion, and Environmental Sustainability," *Environment and Behavior* 34, no.1 (January 2002): 27.

[64] Stephen Gough and William Scott, "Promoting Environmental Citizenship through Learning: Toward a Theory of Change," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 268, 271; Nicholas Nash and Alan Lewis, "Overcoming Obstacles to Ecological Citizenship: The Dominant Social Paradigm and Local Environmentalism," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 155-156; Dobson and Bell, "Introduction," 12; Bronislaw Szerszynski, "Local Landscapes and Global Belonging: Toward a Situated Citizenship of the Environment," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 94.

In other words, knowledge is situated. Studies of situated cognition have shown that learning is a process in which activities, physical context, and culture are interdependent components.[65]

Learning is situated not only in place, it is also situated in social context. Research addressing communities of practice has shown that much of human knowledge is gleaned through social participation in everyday activities.[66] Ecological learning is no difference and most effectively happens through informal interactions with peers, which allows for the building of a community with shared knowledge, behavioral norms, and values. As a person learns to function as a member of a community these informal social contracts constitute a means through which community values and attitudes are reinforced.[67] With time, a community member tends to acquire the subjective viewpoint of the community, and normative influences on ecological viewpoints are no different. Human knowledge is dynamically constructed and through extended periods of participation within a community, learners will likely except the group's cultural practices as their own.[68] The process of ecological learning involves a circling back in which appropriation of community specific habits, norms, and attitudes causes a reassessment and shifting of more general awarenesses, values, and worldview.[69] The daily

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[65] Allan Collins, John Seely Brown, and Susan E. Newman, "Cognitive Apprenticeship: Teaching the Craft of Reading, Writing, and Mathematics," in *National Institute of Education* (Technical Report No. 403, January 1987), 1; Dobson, *Citizenship and the Environment,* 177; Gough and Scott, "Promoting Environmental Citizenship through Learning," 266; John Seely Brown, Allan Collins, and Paul Duguid, "Situated Cognition and the Culture of Learning," *Educational Researcher* 18, no.1 (Jan-Feb 1989): 32-33., 41; John Seely Brown and Paul Duguid, "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation," *Organizational Science* 2, no.1 (February 1991): 47.

[66] William J. Clancey, "Scientific Antecedents of Situated Cognition," in *Cambridge Handbook of Situated Cognition*, ed. Philip Robbins and Murat Aydede (New York: Cambridge University Press, 2008), 19.

[67] David Machles, Ed Bonkemeyer, and Jackie McMichael, "Community of Practice: A Workplace Safety Case Study," *Professional Safety* (January 2010): 46; Stern et al., "Values, Beliefs, and Proenvironmental Action," 1614.

[68] Brown and Duguid, "Organizational Learning and Communities-of-Practice," 48; Clancey, "Scientific Antecedents of Situated Cognition," 19; Jean Lave and Etienne Wenger, *Situated Learning: Legitimate Peripheral Participation* (New York: Cambridge University Press, 1991), 95; Stern et al., "Values, Beliefs, and Proenvironmental Action," 1613.

[69] Stern, Dietz, and Guagnano, "The New Ecological Paradigm in Social-Psychological Context," 726; Clancey, "Scientific Antecedents of Situated Cognition," 14; William J. Clancey, "A Transactional Perspective on the Practice-Based Science of Teaching and Learning," in *Theories of Learning and Studies of Instructional Practice*, ed. Timothy Koschmann (New York: Springer, 2011), 252-253.

spaces in which these cognitions are constructed are a part of this ecological behavior setting.[70] Aspects of place will then reinforce behaviors and help to inform future behaviors.[71]

Universities are ideal places to learn the habits and virtues of ecological citizenship, which are unlikely to be learned in smaller, homogenous social groupings such as a church or home.[72] The voluntary association with larger social groupings is the primary means of learning and becoming an ecological citizen.[73] This is especially true of universities if the whole school is seen as a vehicle for environmental learning — including not only the curriculum and social organizations but also the buildings and grounds.[74] Life events, such as going to college, often function as moments around which a person's values and norms can pivot. Community-identity and self-identity are closely linked, especially at these times of readjustment.[75] Residence halls are typically viewed as transitional places, however a student's daily life can be an important part of their educational experience and can play a significant role in their ecological learning.[76] Residence halls are a place where students learn how to live independently, and, because universities are embedded in their surrounding urban communities, they can offer students opportunities for real world experiences which can accelerate changes in a students environmental worldview.[77]

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[70] Lubomir Popov and Ivan Chompalov, "Crossing Over: The interdisciplinary Meaning of Behavior Setting Theory," *International Journal of Humanities and Social Science* 2, no. 19 (October 2012): 18-27. Popov and Chompalov describe behavior setting as the relationship between normal behavior in a specific situation and the structural characteristics of that situation. This is based on Roger Barker's theory which has been expanded by Allan Wicker to encompass behavior settings as social constructions; and by Urs Fuhrer to include behavior setting facets of shared conventions, physical objects and their meaning, architectural milieu, and the schedules of living.

[71] Clancey, "Scientific Antecedents of Situated Cognition," 24.

[72] Dobson, *Citizenship and the Environment,* 197; Andrew Dobson, "Environmental Citizenship: Towards Sustainable Development," *Sustainable Development* 15 (2007): 283.

[73] Horton, "Demonstrating Environmental Citizenship?," 129.

[74] Dobson, *Citizenship and the Environment,* 176.

[75] Horton, "Demonstrating Environmental Citizenship?," 142.

[76] Fatemeh Khozaei et al., "Examination of Student Housing Preferences, Their Similarities and Differences," *Facilities* 32, no.11/12 (2014): 710.

[77] Monica Carlsson and Bjarne Bruun Jensen, "Encouraging Environmental Citizenship: The Roles and Challenges for Schools," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 260; Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm," 437.

People learn best when they know how to get something done: are supplied with the knowledge, understanding, aptitude, and values.[78] In terms of ecological behaviors, people are generally good about accepting responsibility for local, immediate environmental problems which relate to their everyday environment, and which involve understandings and values that are already embedded in their community. However, people often have problems linking local issues and actions to a global context.[79] It is frequently assumed that institutions or large companies will address global concerns on behalf of society. This lends to a sense that individual and local community behavior can achieve little and this lack of self-efficacy can propagate a reduced ecological awareness.[80] A large part of learning to become an ecological citizen is learning how to act in a way that will matter.[81] University residence halls are a place where education that is connected to the daily life of the students can function to link an awareness of consequences to an awareness of responsibility and foster a positive ecological attitude by highlighting how active participation in ecological communities and the performance of sustainable behavior patterns can matter both locally and globally (Figure 10, page 26).

2.4. Place Theory

The previous section linked educational theories into the Ecological Behavioral Framework; this section discusses place theories that are relevant to this dissertation including behavioral settings theory and normative theory, and ties them into this study's Ecological Behavioral Framework. Place is addressed as a multilayered and nested social construct and the potential for aspects of place to affect ecological behavioral learning are considered.

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[78] Dobson, "Environmental Citizenship," 283; Dobson, *Citizenship and the Environment,* 184.

[79] David Uzzell and Nora Rathzel, "Transforming Environmental Psychology," *Journal of Environmental Psychology* 29 (2009): 341; Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 175.

[80] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 159, 175-176; Dobson and Bell, "Introduction," 13; Uzzell and Rathzel, "Transforming Environmental Psychology," 346.

[81] Dobson, *Citizenship and the Environment,* 181.
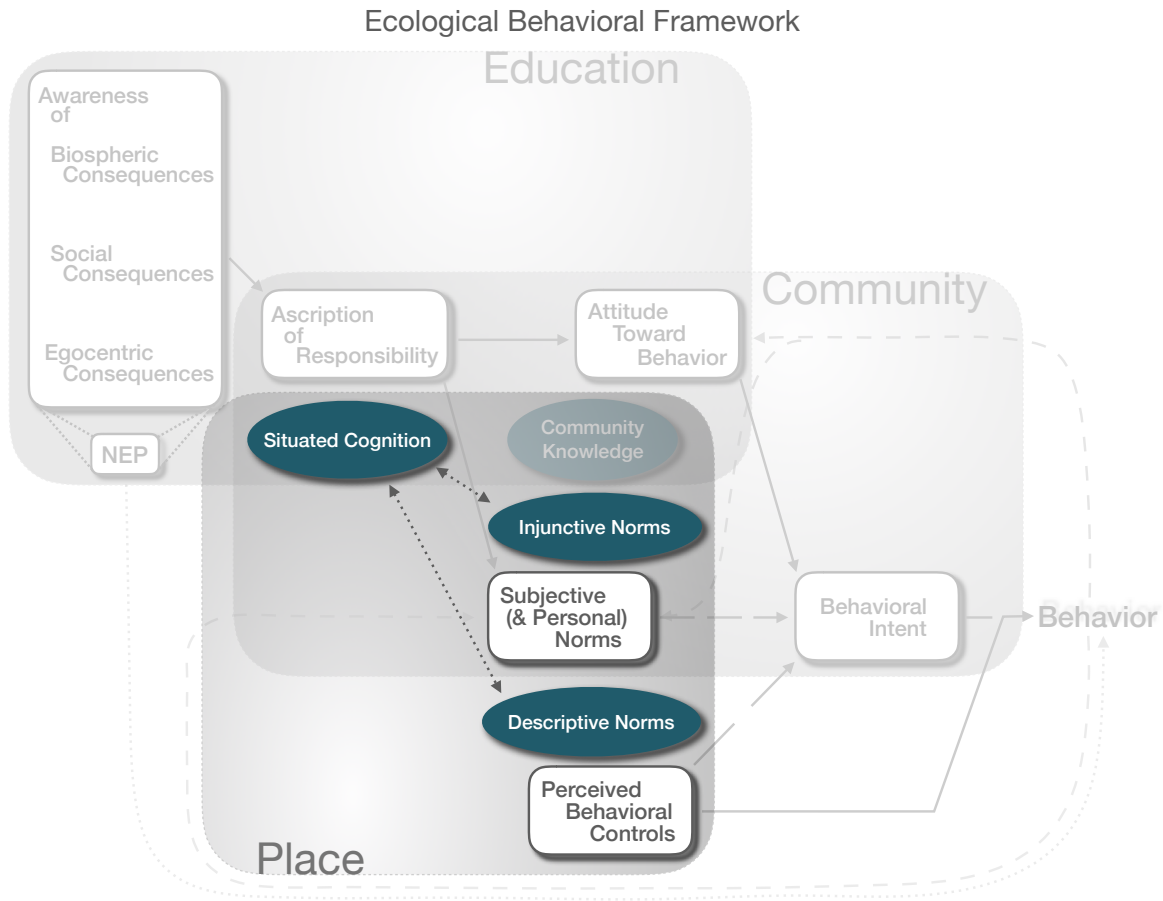
Figure 11. Place in the Ecological Behavioral Framework.

Adapted from Figure 8 and place theory from Amos Rapoport; David Canter; John Seely Brown, Allan Collins, and Paul Duguid; Andrew Dobson; David Uzzell, Enric Pol, and David Badenas; Sverker C. Jagers, Johan Martinsson, and Simon Matti; James Connelly.

Source: Amos Rapoport, Culture, Architecture, and Design (Chicago, IL: Locke Science Publishing Company, Inc., 2005), 11-12; David Canter, The Psychology of Place (London: The Architectural Press Ltd., 1977), 1, 17, 23, 117-122, 148; John Seely Brown, Allan Collins, and Paul Duguid, "Situated Cognition and the Culture of Learning," Educational Researcher 18, no.1 (Jan-Feb 1989): 37; Andrew Dobson, Citizenship and the Environment (New York: Oxford University Press Inc., 2003), 163; David Uzzell, Enric Pol, and David Badenas, "Place Identification, Social Cohesion, and Environmental Sustainability," Environment and Behavior 34, no.1 (January 2002): 44; Sverker C. Jagers, Johan Martinsson, and Simon Matti, "The Environmental Psychology of the Ecological Citizen: Comparing Competing Models of Pro-Environmental Behavior," Social Science Quarterly (2016): 4; James Connelly, "The Virtues of Environmental Citizenship," in Environmental Citizenship, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 71.

In terms of sustainability, though the built environment cannot generate behavior, it can certainly act as a catalyst by supporting or inhibiting particular behavior patterns, and by offering direct or indirect cues to behavior.[82] Roger Barker's theory of Behavior Settings describes behaviors as being performed within physical and social environments, that are both in part shaped by behavior patterns, and help to communicate and reinforce which actions are culturally appropriate and expected.[83] These cultural understandings of place-types and social constructions of place help to shape behavior patterns.[84] The physical constituents of place are a significant component in this cognitive milieu: consciously, place affects a person's reflections on possible actions; subconsciously, place impacts conceptions and perceptions of situations; serially, behaviors are integrated into the physical world.[85] The concept of place is made up of the relationship between actions, conceptions, and physical settings.[86]

Places can be evocative. Our understanding of a situation helps to produce behavior and the physical environment can be a source of that understanding. In Normative theory, place can influence behavior through Injunctive and Descriptive norms. Injunctive norms express influence through a person's observation of others' behaviors. Descriptive norms express influence through a person's observation of the condition of the environment. Both of these expressions help to inform a sense of what is considered normal behavior in a specific situation.[87] Based on past experiences, places are recognized and understood to hold certain functions and cue specific appropriate behaviors.[88] Through the repetition of behaviors in a

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[82] Rapoport, *Culture, Architecture, and Design*, 11-12.

[83] Roger G. Barker and Herbert F. Wright, "Psychological Ecology and the Problem of Psychosocial Development," *Child Development* 20, no.3 (September 1949): 136-137.

[84] Gerald D. Weisman, "The Place of People in Architectural Design," in Architectural Design *Portable Handbook: A Guide to Excellent Practices*, ed. Andy Pressman (New York: McGraw-Hill, 2001), 162-163.

[85] Canter, *The Psychology of Place*, 159; Clancey, "Scientific Antecedents of Situated Cognition," 14.

[86] Canter, *The Psychology of Place*, 158; Kevin Lynch, *The Image of the City* (Cambridge, MA: The MIT Press, 1960), 6.

[87] Doug Mckenzie-Mohr, *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing*, 3rd edition (Gabriela Island, BC: New Society Publishers, 2011), 63.

[88] Canter, *The Psychology of Place*, 1, 17, 23, 117-122, 148; Jung-Hye Shin and Shadeequa Miller, "Audio-Visual Environment and the Religious Experiences in Green Church Buildings: A Cross-Case Study," *Journal of Interior Design* 39, no.3 (2014): 2.

specific place-type, social and personal norms are formed.[89] Behavioral norms that are constructed in one setting will then influence behaviors in other similar places, and in future situations.[90] In other words, everyday behaviors that are learned in a residence hall can influence students' future everyday behaviors.

The concept of place is inherently socio-physical and is a multilayered and nested system. Physical places of graduating size can overlap each other or encompass each other, each sitting within the one immediately larger — in this study for example: a residence hall room, suite, floor, building, neighborhood — and the conceptions and activities within one influence and merge into the others. Ecological learning at the scale of a residence hall floor or building will extend both into personal, private spaces as well as out into the surrounding neighborhood.[91]

There is the potential for places to anchor sustainable values and behaviors if the design of the built landscape makes ecological actions easy and environmental education is implemented.[92] The explanatory power of the Value-Belief-Norm theory has been shown to be greatest for low cost behaviors — in other words behaviors made easy by the built environment.[93] This suggests that the concept of place, which associates most directly with components from the Theory of Planned Behavior, is what is missing in the Value-Belief-Norm theory's framework and offers a concrete reason for using the combined theoretical framework for this study (Figure 11). Physical qualities of place impact one's perceived control over behavioral choices. Not only can a setting hinder or encourage certain actions, physical place can also function as a reminder of ecological value-priority behavioral possibilities.[94] Signals

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[89] Brown, Collins, and Duguid, "Situated Cognition and the Culture of Learning," 37; Dobson, *Citizenship and the Environment,* 163; Canter, *The Psychology of Place*, 1.

[90] Uzzell and Rathzel, "Transforming Environmental Psychology," 347; Lynch, *The Image of the City,* 9, 13.

[91] Jung-Hye Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort: A Process-Oriented and Contextually Sensitive Theoretical Framework," *Journal of Environmental Psychology* 45 (March 2016): 12.

[92] Uzzell, Pol, and Badenas, "Place Identification, Social Cohesion, and Environmental Sustainability," 44.

[93] Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 4.

[94] James Connelly, "The Virtues of Environmental Citizenship," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 71.

sent by the physical environment can contribute to the performance of sustainable behaviors and help to promote ecological citizenship.[95]

Perceived Behavioral Control is the behavioral model's component that not only influences Behavioral Intent, but is also the only variable in the Ecological Behavioral Theory Framework that can directly affect a behavioral outcome and is the variable most affected by the built landscape (Figure 11). Ecological identity is about the production and reproduction of sustainable daily habits, in other words Subjective and Personal Norms. Residence halls that are designed to encourage ecological learning can facilitate sustained relationships between people and their environments — which can then impact larger place systems as well as an individual's ecological identity and future behavior patterns.[96]

2.5. Community and Identity Theory

The previous two sections linked relevant educational theory and place theory into the Ecological Behavioral Framework. This section will address germane community and identity theories. This section first discusses the normative influence of community on both social and individual identities. Then relationships between these identities and behavior is examined. The influence of the physical environment on community identity is discussed through expanded behavior settings constructs. Finally, the connections between community and identity theory and this study's Ecological Behavioral Theory Framework are outlined.

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[95] Horton, "Demonstrating Environmental Citizenship," 136, 145.

[96] Khozaei et al., "Examination of Student Housing Preferences, Their Similarities and Differences," 710.

Education

Awareness
of

Biospheric
Consequences

Social
Consequences

Egocentric
Consequences

NEP

Ascription
of
Responsibility

Situated Cognition

Community
Knowledge

Injunctive Norms

Subjective
(& Personal)
Norms

Descriptive Norms

Attitude
Toward
Behavior

Community

social identity

self-identity

Social Diffusion

Behavioral
Intent

Behavior

Perceived
Behavioral
Controls

Place

Figure 12. Community in the Ecological Behavioral Framework.
Adapted from Figure 8 and social theory from David Uzzell, Enric Pol, and David Badenas; Jung-Hye Shin; David Uzzell and Nora Rathzel; Dave Horton; David Canter.
Source: David Uzzell, Enric Pol, and David Badenas, "Place Identification, Social Cohesion, and Environmental Sustainability," Environment and Behavior 34, no.1 (January 2002): 28-30; Jung-Hye Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort: A Process-Oriented and Contextually Sensitive Theoretical Framework," Journal of Environmental Psychology 45 (March 2016): 14; David Uzzell and Nora Rathzel, "Transforming Environmental Psychology," Journal of Environmental Psychology 29 (2009): 346; Dave Horton, "Demonstrating Environmental Citizenship? A Study of Everyday Life Among Green Activists," in Environmental Citizenship, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 131,134; David Canter, The Psychology of Place (London: The Architectural Press Ltd., 1977), 128.

The problem of environmental sustainability is, at its core, a social issue.[97] Community

members tend to adopt the ideological values of their group as they become socialized in their

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[97] Gough and Scott, "Promoting Environmental Citizenship through Learning," 269.

environment. These values eventually become ingrained and, after time, are often perceived as objective reality.[98] In this way, social networks have a powerful normative influence on behavior through the social diffusion of shared values, expectations, and social norms.[99] Ecological identification involves the acquisition and practice of environmental norms and attitudes through community membership.[100] Expansions of behaviors settings theory by Alan Wicker and by Urs Fuhrer introduce more cognitive approaches that stress that behavior settings are social constructions. Within a behavioral milieu which includes physical place and denotative and connotative place meanings, these authors emphasize the contributions of interactive behavior, socially shared conventions, and community norms and values.[101]

As people adopt behaviors and belief systems of new social groups, reciprocated values and norms set the terms for behavioral attitudes and intentions.[102] Time spent in green communities leads to the acquisition and performance of ecological knowledge, awareness, and understanding; and the reorganization of everyday life according to these sustainable standards.[103] Individuals make judgments about environmental behaviors using the norms and visible habits embedded within a community.[104] As a person learns how to act sustainably there is a convergence between normative practices and the development of their own social

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[98] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 159.

[99] Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 14.

[100] Uzzell, Pol, and Badenas, "Place Identification, Social Cohesion, and Environmental Sustainability," 28, 30; John Seely Brown, Allan Collins, and Paul Duguid, "Situated Cognition and the Culture of Learning," *Educational Researcher* 18, no.1 (Jan-Feb 1989): 34.

[101] Allan W. Wicker, "Behavior Settings Reconsidered: Temporal Stages, Resources, Internal Dynamics, Context," In *Handbook of Environmental Psychology, Vol. 2*, ed. Daniel Stocols and Irwin Altman (New York: Wiley and Sons, 1987), 616; Urs Fuhrer, "Bridging the Ecological-Psychological Gap: Behavior Settings as Interfaces," *Environment and Behavior* 22, no.4 (July 1990): 527.

[102] Uzzell, Pol, and Badenas, "Place Identification, Social Cohesion, and Environmental Sustainability," 30; Uzzell and Rathzel, "Transforming Environmental Psychology," 346; Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 14; Lynch, *The Image of the City,* 7.

[103] Horton, "Demonstrating Environmental Citizenship," 134, 140-141.

[104] Horton, "Demonstrating Environmental Citizenship," 131, 134; Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 13; Uzzell and Rathzel, "Transforming Environmental Psychology," 340.

identity. Within communities, social conformity leads to the formation of social identity. Green performances emerge and build into ecological social identity.[105]

Repetitive practices influence and reproduce social expectations.[106] Ecological behaviors that become habitual have the potential to powerfully influence conceptual systems.[107] These behaviors are not entirely rational: some behavior patterns, habits, and social norms are based on cultural factors and associative reasoning.[108] In this way, the concept of community, even at a subconscious and associative level, can have a significant effect on ecological footprints which are made up of the behavioral patterns of daily life.[109] Ecological schemata can be transmitted through this process of enculturation and part of this process involves how social behaviors relate to the built environment.[110]

Social identity helps to define self-identity. As ecological social identity is performed through daily behaviors, social expectations become social responsibilities and these responsibilities relate to public as well as private behaviors.[111] In this way social norms become personal norms and thus the Social Norms component of the Value-Belief-Norm model equates closely with the Personal Norms component of the Theory of Planned Behavior and addressing these as a combined variable is justified (Figure 12).

Specific self-identities help to predict relevant behaviors: an environmental self-identity, which is reflected in environmental attitudes and beliefs, tends to predict sustainable

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[105] Horton, "Demonstrating Environmental Citizenship," 143; Siegwart Lindenberg and Linda Steg, "Goal-Framing Theory and Norm-Guided Environmental Behavior," in *Encouraging Sustainable Behavior: Psychology and the Environment*, ed. Hans C. M. van Trip (New York: Psychology Press, 2014), 37-54.

[106] Ira J. Cohen, *Structuration Theory: Anthony Giddens and the Constitution of Social Life* (London: MacMillan Education Ltd., 1989), 38-40.

[107] Canter, *The Psychology of Place*, 128; Dobson, "Environmental Citizenship," 278.

[108] Uzzell and Rathzel, "Transforming Environmental Psychology," 340.

[109] Dobson, *Citizenship and the Environment,* 122; Brown, Collins, and Duguid, "Situated Cognition and the Culture of Learning," 34; Clancey, "Scientific Antecedents of Situated Cognition," 27.

[110] Rapoport, *Culture, Architecture, and Design*, 78, 103.

[111] John Shannon Hendrix, *Architecture and Psychoanalysis: Peter Eisenman and Jacques Lacan* (New York, NY: Peter Lang Publishing, Inc., 2006), 75; Erving Goffman, *The Presentation of Self in Everyday Life* (New York: Anchor Books, 1959), 35, 81, 252-253.

behaviors.[112] Self-identity accrues meaning through the social relations within a community and through this, a self-identity will influence behaviors beyond the boundaries of that community's place.[113]

Environmental design research shows that residential environments are composed of physical and social structures and that both exist as multilayered, nested systems. Place-related social identities are an important dimension of environmental attitudes, and, as with concepts of place, the social dimensions of one set of connections will affect social relationships at other scales.[114] The aspects of community fostered within a residence hall can have an impact both on private activities and on a larger neighborhood's social system. Students who identify as ecologically conscious within the bounds of a residence hall community are likely to act sustainably in other locations as well.

Though identities do evolve over a persons lifetime, self identity is influenced by past behaviors and past social identities.[115] Residence hall residents who learn to hold environmentally sustainable attitudes and practice sustainable norms will begin to identify, socially and individually, as ecological citizens and will go out into the world with that ecological consciousness as a foundation for future behaviors and future conceptions of self.

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[112] Ellen Van Der Werff, Linda Steg, and Kees Keizer, "The Value of Environmental Self-Identity: The Relationship between Biospheric Values, Environmental Self-Identity and Environmental Preferences, Intentions and Behavior," *Journal of Environmental Psychology* 34 (2013): 56.

[113] Jagers, Martinsson, and Matti, "The Environmental Psychology of the Ecological Citizen," 3; Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 16; Van Der Werff, Steg, and Keizer, "The Value of Environmental Self-Identity," 55-57, 60.

[114] Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 12; Barker and Wright, "Psychological Ecology and the Problem of Psychosocial Development," 136.

[115] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 156; Beck and Ajzen, "Predicting Dishonest Actions Using the Theory of Planned Behavior," 289, 299.

2.6. Residence Hall Studies

The previous sections of Chapter 2 worked to assemble the Ecological Behavioral Framework that will be employed to explore the complex relationships that exist between residence halls' built environments and the ecological behavioral-learning of the residents. In this section, contemporary aspects of ecological residence hall designs are outlined and trends in residence hall research are delineated highlighting a lack of an environment-behavior approach to studies that address sustainability and residence halls.

Universities and colleges play a prominent role in our culture. There are approximately 140,000 colleges and universities in the United States and almost a quarter of our population sets foot on or attends a college or university everyday. In 2017 there were more 20.4 million students.[116] Since the 1990s many colleges and universities have made commitments to incorporate sustainability into their standards —this includes standards that address curriculum, research, buildings, and grounds.[117]

Current trends in university residence halls involve student expectations of suite or apartment style housing which includes private bathrooms, private bedrooms, kitchens, and social spaces. Residence halls are now frequently located off-campus and almost half of residence hall residents prefer this.[118] Even though campus residence are becoming more like apartment living, campus residents tend to have higher energy consumption rates than private residents because students' fees are not directly related to energy use.[119] A case study in 2010 at the University of Otago in New Zealand, tracked student resource consumption in two residence halls through winter and spring semesters and concluded that the students in the

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[116] Driza, "Optimal Building Performance," 21; National Center for Education Statistics, "Fast Facts," https://nces.ed.gov/fastfacts (accessed January 7, 2018).

[117] The Princeton Review, "Guide to 375 Green Colleges, 2017," https://www.princetonreview.com/college-rankings/green-guide (accessed January 7, 2018).

[118] Claire Reeves La Roche, Mary A. Flanagan, and Kenneth Copeland Jr., "Student Housing: Trends, Preferences and Needs," *Contemporary Issues in Education Research* 3, no.10 (October 2010): 46; Khozaei et al., "Examination of Student Housing Preferences, Their Similarities and Differences," 718.

[119] Driza, "Optimal Building Performance," 51-52.

residence halls consumed 35% more resources than an average student living in private accommodations. Multiple studies show that student who live in residence halls are generally unaware of their consumption levels and unaware of their environmentally significant behaviors.[120]

Research that addresses residence halls and sustainability through an architectural lens tends to focus on LEED designs and building efficiency.[121] These discussions are usually framed in a way where occupant behaviors are treated as a metric that can be measured and then better predicted, with the goal of increasing a building's efficiency performance.[122] Studies that specifically address residence halls with the goal of increasing the residents' sustainable behaviors either focus on the implementation of eco-programs which seek to increase the students' knowledge of their behavioral impact; or they focus on incentive programs meant to encourage immediate shifts in residents' behavior toward a more sustainable model.[123] However, as discussed earlier in the educational theory section of this chapter, learning cannot

[120] Marthinus J. Bekker et al., "Encouraging Electricity Savings in a University Residential Hall Through a Combination of Feedback, Visual Prompts, and Incentives," *Journal of Applied Behavior Analysis* 43 (2010): 327.

[121] Examples of studies that address sustainability through a focus on LEED assessment: Habib M. Alshuwaikhat, Ismaila Abubakar, "An Integrated Approach to Achieving Campus Sustainability: Assessment of the Current Campus Environmental Management Practices," *Journal of Cleaner Production* 16 (2008): 1777-1785; Cathy Turner, "A Post-Occupancy Look at LEED Building Performance: Assessing Energy-, Water-Efficiency Measures in 11 New Buildings in the Pacific Northwest," *Heating, Plumbing, Air Conditioning Engineering* 78, no.10 (October 2006): 26-33.

[122] Examples of studies that address sustainability and treat occupant behaviors as a metric to be solved: Caroline M. Clevenger, and John Haymaker, "The Impact of the Building Occupant on Energy Modeling Simulations," *Definition and Simulation of Occupant Behavior in Buildings: Conference Proceedings - Joint International Conference on Computing and Decision Making in Civil and Building Engineering*, 1-10, Energy in Building and Communities Programme, 2006, http://annex66.org/?q=node/100 (accessed July 18, 2016); Pamela-Jean N.Driza, and Nam-Kyu Park, "Actual Energy and Water Performance in LEED-Certified Educational Buildings," *Sustainability: The Journal of Record* 6, no.4 (August 2013): 227-232; Mindy Hadi, and Chloe Halfhide, "Green Buildings: Understanding the Role of End User Behavior," in *Going Green: The Psychology of Sustainability in the Workplace*, ed. Dean Bartlett. (London: The British Psychology Society, 2011): 31-35; Len Reed, "Stripping Away Efficiency: It Turns Out Humans Can Undo the Savings of Green Buildings," *Oregon Environmental News* (2009), http://www.oregonlive.com/environment/index.ssf/2009/05/the_inefficient_secret_of_ener.html (accessed July 18, 2016).

[123] Examples of studies that focus on knowledge or incentives to incite sustainable behaviors: Bekker et al., "Encouraging Electricity Savings in a University Residential Hall," 327-331; Amanda Harker, "Influencing Energy Consumption Behavior in Residence Halls through Education and Outreach," *SS-AAEA Journal of Agricultural Economics* (2013): 1-12, http://purl.umn.edu/187010 (accessed August 18, 2016); Seung Hyo Jong, Rimas Gulbinas, Rishee K. Jain, and John E. Taylor, "The Impact of Combined Water and Energy Consumption Eco-Feedback on Conservation," *Energy and Buildings* 80 (September 2014): 114-119; John E. Peterson, Cynthia M. Frantz, Rumi Shammin, Tess M. Yanisch, Evan Tincknell, and Noel Myers, "Electricity and Water Conservation on College and University Campuses in Response to National Competitions among Dormitories: Quantifying Relationships between Behavior, Conservation Strategies, and Psychological Metrics," *PLoS ONE* 10, no.12 (2015), e0144070. doi:10.1371/journal.pone.0144070 (accessed August 18, 2016).

effectively be based solely on supplying more knowledge, nor do incentive programs lend to

lasting behavioral change.[124]

    There are a few studies that begin to link ecological behavioral-learning with the built

environment of residence halls, but these are usually framed within a dialogue of health and

wellness and only go so far as to suggest that residence hall designs should include spaces for

ecological groups to meet and green spaces for gardens and nature connections — but the

everyday spaces that hold daily habits, such as the students' rooms and suites (and it is

everyday behaviors which define an ecological identity) are not addressed.[125] There is a general

assumption that universities can help to transform the future through imparting sustainable

values onto their students, but addressing how beyond the inclusion of sustainable curriculum

topics or the support of sustainability research is not delineated.[126] Residence halls can help to

influence students towards sustainable lifestyles but what is missing in the literature of

residence hall studies is research that looks at using the built landscape as a tool to be used

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[124] Dobson and Bell, "Introduction," 3, 12; Stephen Gough and William Scott, "Promoting Environmental Citizenship through Learning: Toward a Theory of Change," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 268, 271; Nicholas Nash and Alan Lewis, "Overcoming Obstacles to Ecological Citizenship: The Dominant Social Paradigm and Local Environmentalism," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 155-156; Bronislaw Szerszynski, "Local Landscapes and Global Belonging: Toward a Situated Citizenship of the Environment," in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 94.

[125] Example of a study which discusses the need for green spaces within the residence hall but does not address any everyday-type spaces: Jamie Devereaux, "Green Living: Why Invest in a Deep Green Residence Hall?" *Sustainability: The Journal of Record* Vol.4 no.3 (June 2011): 121-127.

[126] Examples of studies and statements that assume universities can have a significant impact on a sustainable future: Ali Whitmer, Laura Ogden, John Lawton, Pam Sturner, Peter M Groffman, Laura Schneider, David Hart, Benjamin Halpern, William Schlesinger, Steve Raciti, Neil Bettez, Sonia Ortega, Lindsey Rustad, Steward TA Pickett, and Mary Killelea, "The Engaged University: Providing a Platform for Research That Transforms Society," *Frontiers in Ecology and the Environment* 8, no.6 (August 2010): 314-321; The Association for the Advancement of Sustainability in Higher Education, *STARS Technical Manual, Version 2.1.3, July 2017,* https://stars.aashe.org/pages/about/technical-manual.html (accessed August 17, 2017); The Association for the Advancement of Sustainability in Higher Education, *"*STARS Participants and Reports," https://stars.aashe.org/institutions/participants-and-reports (accessed January 7, 2018); American College and University Presidents Climate Commitment. *Implementation Guide: Information and Resources for Participating Institutions, V.1.1, 2009*. http://sustainability.ucr.edu/docs/acupcc-ig.pdf (accessed February 17, 2017): "Overview of the Commitment," 7, and "Appendix A," 37.

toward everyday environmental learning and relating specific design elements to behavioral

variables that affect ecological learning and ecological habit formation.[127]
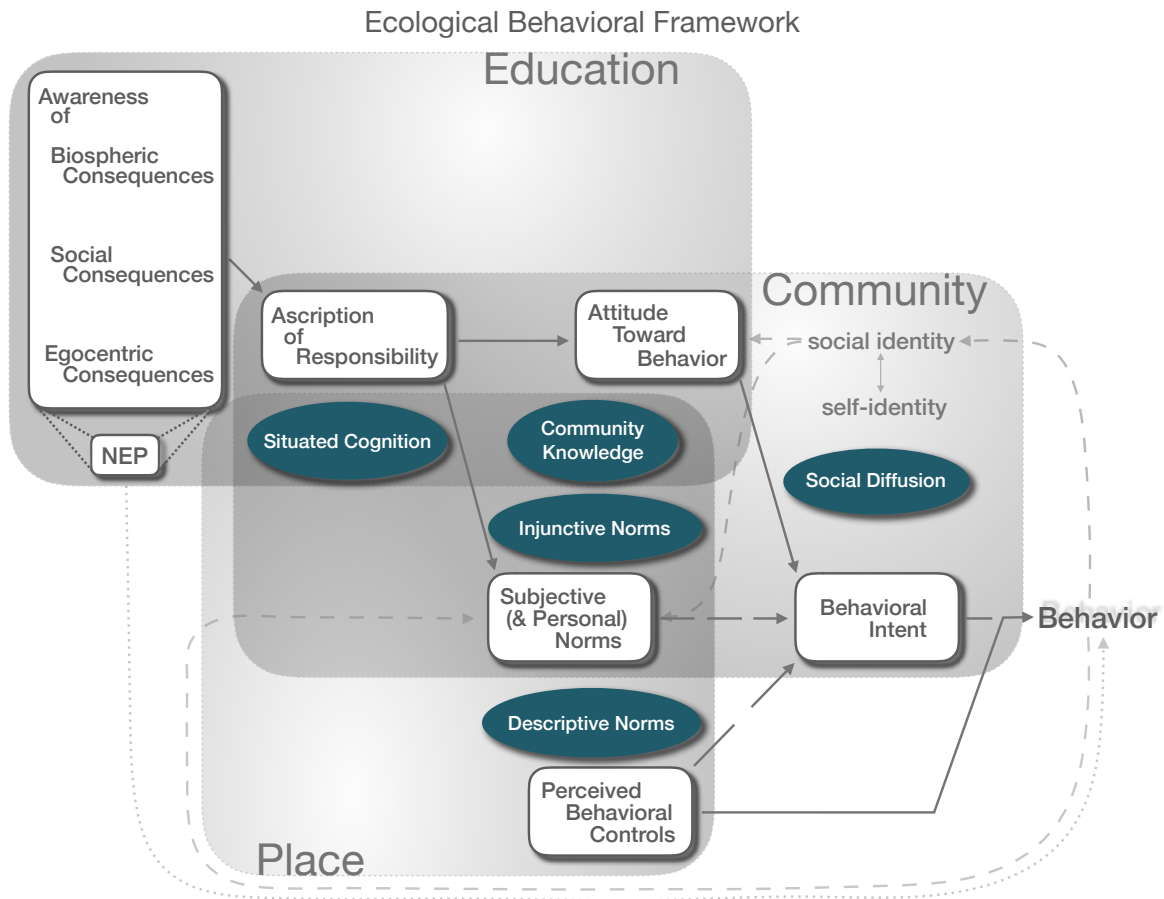
Figure 13. Ecological Behavioral Theory Framework.
Based on the work of Figures 9 through 12 and their corresponding sections.
When studying the relationship between the built landscape and ecological behaviors, embedded in the Ecological Behavioral Framework are components that relate to directly to theories of Education (awareness, responsibility, attitudes to situated learning and cognition, communities of practice, citizenship theory, etc.); components that relate directly to concepts of Place (perceived behavioral controls, norms to situated cognition, environment behavior studies, etc.); and components that relate directly to concepts of Community (attitudes, norms, intentions to communities of practice, situated cognition, etc.).

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[127] There are precedents for this kind of study. In environment behavior studies, there have been studies of how architectural design can improve productivity in offices and office buildings for approximately 45 years. An example of this kind of study with an ecological focus: Amanjeet Singh, Matt Syal, Sue C. Grady, and Sinem Korkmaz, "Effects of Green Buildings on Employee Health and Productivity," *American Journal of Public Health* 100, no.9 (September 2010): 1665-1668.

2.7. Theory Conclusions

This dissertation uses its Ecological Behavioral Framework to explore some of the relationships that exist between the built landscape of residence halls and the everyday ecological learning of the students. This section reviews the construction of the Ecological Behavioral Framework, reiterating the major steps taken in the preceding sections, and then describes the general research objectives for this study.

The theoretical framework for this research is designed to examine the relationship between everyday built landscapes and the learning and support of environmentally sustainable behavior patterns (Figure 13). There are two primary behavioral theories that social-environmental researchers commonly use to study environmentally significant behaviors: the Value-Belief-Norm Theory (Figure 5, page 19) and the Theory of Planned Behavior. (Figure 4, page 17) Both models have been shown to have some success predicting sustainable behaviors. The values associated with the New Ecological Paradigm can be integrated into the Value-Belief-Norm theory's framework which increases the model's ability to assess relationships that explain pro-environmental behaviors. However, both models have their weaknesses: the Value-Belief-Norm model lacks a variable relationship that allows its most significant variable, Awareness of Consequences, to directly relate to behavioral outcomes; and in the Theory of Planned Behavior model, the variable that is most likely to predict pro-environmental behaviors, Social and Personal Norms, is the least significant component. These two behavioral models can be connected through an examination of a Schematic Causation Model of Environmental Concern (Figure 8, page 23), and this combined model has been shown to increase the predictive capability of both theories.

This combined Ecological Behavioral Framework can not only work to explain social and personal influences on behavioral outcomes, this model can also tie in behavioral influences supplied by the built environment. Educational theory ties into this framework by linking aspects of student experience to the Awareness of Consequences, the Ascription of Responsibility, and the Attitude Toward Behavior metrics. Place theory relates to the Subjective

and Personal Norms and the Perceived Behavioral Controls components of the model.

Community and Identity theories correlates with the Attitude Toward Behavior, the Subjective

and Personal Norms, and the Behavioral Intent variables of the framework. By tying

educational theory, place theory, and community and identity theories into the ecological

behavioral framework, this research can begin to examine the complex relationships that exist

between ecological behaviors and the built landscape and start to consider how the built

landscape of residence halls can both directly and indirectly function to encourage and support

students' sustainable behavior patterns. This study will use this Ecological Behavioral

Framework to explore the daily lives of student residents with the hope of uncovering moments

in the daily spaces of the residence halls where aspects of the built landscapes play a role in

either supporting or hindering the growth of environmentally sustainable behaviors.

The objectives of this research are two-fold. First, the goal of this study is to demonstrate

that a theoretical approach based on the Ecological Behavioral Theory Framework (Figure 13)

can be applied practically to an analysis of a built landscape and show that environmentally

significant behaviors can be correlated with specific elements of a built landscape. Though

sustainability is a major focus of architectural design studies, there has yet to be significant

research that explores the mechanisms that relate ecologically significant behaviors with the

built landscapes within which they are learned and performed.[128] There is the potential, through

a better understanding of the physical conditions of environmental citizenship, to connect

factors that influence the performance of environmentally significant behaviors to specific

aspects of the built landscapes of everyday environments.[129]

Second, this study hopes to produce some simple spatial sustainable ideas in the form of

architectural patterns. The hope is that these design patterns can be incorporated into an

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[128] Amos Rapoport remarks on a lack of research which explains the mechanisms that connect built landscapes with behaviors — this is even more true when addressing environmentally significant behaviors; and Braham discusses a lack of an architectural approach when address necessary fundamental cultural shifts toward sustainability.
Amos Rapoport, *Culture, Architecture, and Design* (Chicago, IL: Locke Science Publishing Company, Inc., 2005), 12; Braham, *Architecture and Systems Ecology, 3.*

[129] Horton, "Demonstrating Environmental Citizenship?," 132, 147.

architectural design language that can help to support the learning and growth of ecologically sustainable behaviors.

This study focuses on university residence halls — viewing university systems as existing institutions that have the potential to influence their surrounding community as well as generations of students who pass through. The goal of this study is to use the Ecological Behavioral Framework to uncover any moments in the daily lives of the students where the built landscape of their residence hall affects (directly or indirectly, and either helps or hinders) their environmentally significant behaviors and to reveal these specific aspects of the built environment in order outline a series of design patterns that can help to encourage environmental learning, encourage the performance of sustainable behaviors, and support the growth of ecological social and self-identities within the residence hall landscapes.

3. Methods

This chapter introduces the methodological goals of this study, reviewing aspects of the Ecological Behavioral Theory Framework in order to tie in a number of measurable variables this study uses to explore the residence hall residents' ecologically significant behaviors in relation to their daily life within their built landscapes. The research questions that guide this study are then outlined. This is followed by a site introduction and then a in-depth account of the data sets collected. Next is an overview of the data analysis methods. And finally a brief discussion of expected outcomes will conclude this chapter.

3.1. Methods Introduction

The most obvious place in this study's Ecological Behavioral Theory Framework (Figure 13, page 42) for architectural design to have the potential to affect a behavioral outcome is through the Perceived Behavioral Controls variable. As described earlier in Chapter 2, the built landscape has the potential to play a significant role in cognition: place can affect a person's reflections on possible actions by offering direct or indirect behavioral cues, or by making certain actions more or less easy. The relationship between architecture and behavior is more complex than this however and this dissertation hopes to explore indirect influences of a built environment on ecological behavioral learning as well as direct effects. Places can be evocative and encourage or discourage behaviors based on previous experience in a place-type. Conceptions of place link to conceptions of self and community identities.[130] Literature that addresses ecological behavioral learning tends to stress community influence as a major factor in both the adoption of ecologically significant behaviors into one's daily life and in the development of a sense of ecological self-efficacy.[131] The role of the built landscape in

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[130] Canter, *The Psychology of Place*, 17, 121-123; Rapoport, *Culture, Architecture, and Design*, 33-34.

[131] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 175-176; Stern, "Environmentally Significant Behavior in the Home," 373-375.

community growth can be significant, especially in an environment such as a residence hall. This study aims to examine how the built landscapes of four residence halls relate to the residents' performance of ecological behaviors as well as factors that can affect their ecological behavioral learning which includes the building of a sense of community; the formation of personal and social norms; the development of shared attitudes and intentions; and the relationship between ecological awareness and place experience. All of these factors will be addressed through the lens of the Ecological Behavioral Theory Framework (Figure 13, page 42).

There are a few measurable components that apply to this study that have not been explicitly addressed in the preceding sections:

- The New Ecological Paradigm scale is a group of questions that measure the extent to which a person fits within the New Ecological Paradigm, and through this, the extent to which they can be identified as an ecological citizen. Numerous studies have shown that there is a significant relationship between the New Ecological Paradigm scale and Behavioral Intent, and this scale has been proven to possess predictive validity when anticipating ecological behaviors.[132] An adapted set of these questions is used in this study.[133]

- There are also questions that measure all of the variables of the Value-Belief-Norm model: Awareness of Consequences, Ascription of Responsibility, and Subjective and Personal Norms; as well as the variables of the Theory of Planned Behavior model: Attitude

[132] Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm," 427-436.

[133] Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm," 425-442; Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief- Norm Model," 2797-2833; Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," 1-9; Stern, Dietz, and Guagnano, "The New Ecological Paradigm in Social-Psychological Context," 723-742.

Toward Behavior, Perceived Behavioral Controls, and Behavioral Intent. Adapted sets of

these questions are included in this research.[134]

- Finally the concept of walkability is used as a part of the data to be collected for this

study. In order for a location to be considered successfully walkable, it should offer access

to amenities at a perceived temporal closeness. For example, groceries within a five minute

walk would be perceived as very accessible; but this perception decays up to 30 minutes,

and anything located further than a 30 minute walk away is considered unwalkable.[135]

3.2. Research Questions

This section walks through the research questions that guide this study's explorations.

The leading question for this research is: ***How can the architectural design of everyday***

spaces help to encourage and support sustainable behavior patterns? For the purpose of

this dissertation which focuses on university residence halls, this question becomes: ***How does***

the built landscape of a residence hall affect ecological behavioral learning and the growth

of students' ecological identity?

The theoretical framework for this research is structured on the combination of two

behavioral models, the Value-Belief-Norm theory and the Theory of Planned Behavior, which

have been shown to have predictive validity when addressing sustainable behaviors. This study

ties theories of education, place, and community into this framework in order to further explain

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[134] Aguilar-Luzon et al., "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model," 2797-2833; Garling et al., "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions," 1-9; Stern, Dietz, and Guagnano, "The New Ecological Paradigm in Social-Psychological Context," 723-742; Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm," 425-442.

[135] Jeff Speck, *Walkable City: How Downtown Can Save America, One Step at a Time* (New York: North Point Press, 2012), 11; Walk Score, "Walk Score Methodology," https://www.walkscore.com/methodology.shtml (accessed July 30, 2017).

how the built landscapes of the residence halls directly and indirectly affect the students' daily experiences and ecological behavioral learning. This theoretical model (Figure 13, page 42) suggests a series of more specific questions: ***Are there moments in the daily lives of the residence hall residents where the built landscape can play a role in linking ecological knowledge and awareness with ecological behaviors? Are there moments in the daily lives of the residence hall students where the built environment helps or hinders their ecological behaviors; or has an injunctive or descriptive normative affect on their ecological behaviors? How does the built landscape of the residence halls affect the students' sense of community and how does this affect their ecological behavioral learning?***

The goal of this study is to use the Ecological Behavioral Framework to uncover any moments in the daily lives of the students where the built landscape of the residence halls affects (directly or indirectly, and either helps or hinders) the performance of the residents environmentally significant behaviors and to reveal these specific aspects of the built environment in order to generate a series of design patterns that can help to encourage environmental learning, sustainable behaviors, and the growth of ecological social and self-identities in residence hall landscapes.

3.3. Site Introduction

This section introduces the four residence halls examined in this study.

Ecological citizenship is all about everyday living; daily habits and daily routines. University residence halls are a place-type that has the potential to impart ecological behavioral learning in the daily lives of the student residents.

This desertion will be a comparative case study of four different residence halls affiliated with the University of Wisconsin, Milwaukee. At the time of data collection, all of these residence halls housed primarily freshman and sophomore undergraduate students.

- The Sandburg Towers South-West-North were all built in 1970. They share the same floor plan; are located on UWM's campus; and can house approximately 2100 students (South: 675; West: 525; North: 925).

- Sandburg East Tower was built in 2000. It is located on UWM's campus; houses approximately 550 students; and is connected to the other Sandburg Towers via a connecting building that houses food, commercial, and social resources for the Sandburg residence hall students.
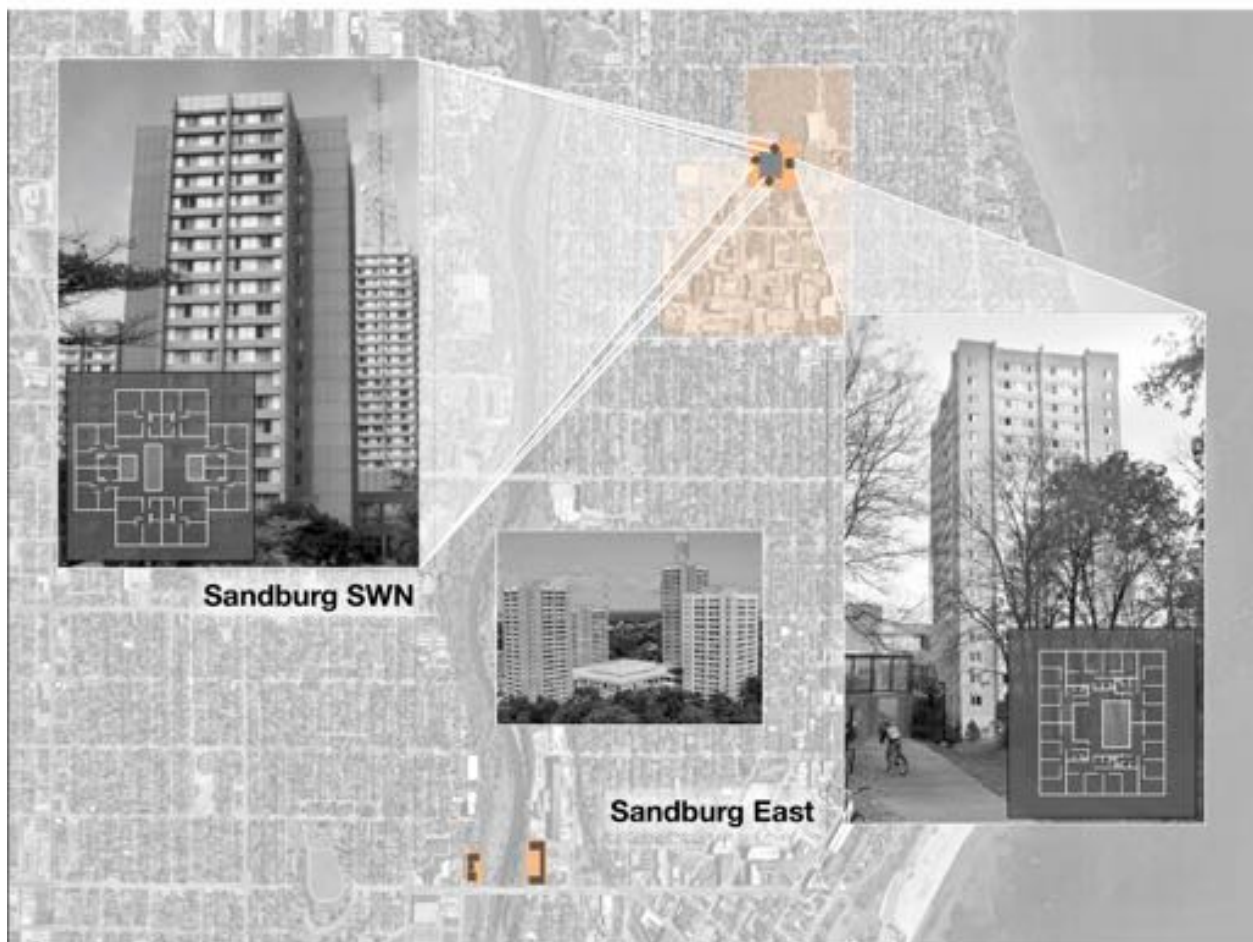
Figure 14. The Sandburg Residence Hall Towers.

- Riverview Residence Hall was built in 2008. It is located approximately two miles south of campus on the Milwaukee River, and houses approximately 425 students.

- Cambridge Commons was built in 2011. It is LEED gold certified; is located approximately two miles south of campus just across the Milwaukee river from Riverview Residence Hall; and houses approximately 600 students.

Figure 15. Riverview Residence Hall and Cambridge Commons.

3.4. Data

This section offers detailed descriptions of the data sets that were collected for this research.

Environmental design research shows that residential environments are composed of physical places and social relations, and that both of these exist as multilayered and nested systems. These types of complex environments are studied best using both subjective and objective appraisals.[136]

In this study there are three data sets which include both quantitative and qualitative data. There is spatial data that includes floor plans of all of the residence hall floors, which show both private and communal spaces; maps that locate the residence halls within their respective neighborhoods; and basic photography of the residence hall spaces relevant to this study.

There is also a survey of 111 questions that was distributed online to the students living in these four residence halls in the spring semester of 2017. The full survey can be seen in *Appendix A: Survey Instrument* (page 218). The survey is designed to measure ecological behaviors, behavioral intent, and attitudes in areas roughly based on LEED categories of ecological focus (water, energy, transportation, resource consumption and waste). There are also questions designed to measure ecological attitudes, social norms, values, and worldview based on the Ecological Behavioral Theory Framework for this study (Figure 13, page 42). For a fully outlined and referenced description of the survey design, see *Appendix B: Survey Design* (page 226).

The third data set is transcriptions from a series of focus groups that were held with students from the four residence halls of this study in the spring semester of 2017. The focus group discussions followed an outline meant to guide the conversations through discussion categories that address the students' daily ecological behavior patterns; attitudes about ecological issues; social forces that influence ecological behaviors and attitudes; as well as

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[136] Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 12, 15.

discussions about places and spaces that the students inhabit as a part of their regular routines. The focus group discussion guideline can be seen in *Appendix C: Focus Group Guideline* (page 234). The general categories of discussion are based generally on LEED categories of ecological focus as well as the this study's theoretical framework (Figure 13, page 42).

3.5. Data Analysis

This section outlines the data analysis methods that were used in this study. First the methods of analysis used for the survey data is described. Then the coding schemes used to analyze the focus group transcriptions are outlined. Finally, there is a discussion that addresses how the goals of this study will be accomplished using all three data sets.

The goal of the data analysis for this study is to link students' ecological behaviors, intentions, habits, attitudes, beliefs, and values to aspects of the residence halls' built environments in order to uncover moments in the daily lives of the students where the built landscape can play an active role in ecological behavioral learning. This study is a mixed methods comparative case study[137] using both quantitative and qualitative data. A triangulation method[138] will be employed to link the survey data (quantitative) and the focus group data (qualitative) to produce analysis outcomes. This is also a convergent-parallel research design[139] because the qualitative and quantitative data sets will be collected from the same pools of students within the same timeframe. Research conclusions will focus on outcomes that are supported by both data sets.

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[137] Colin Robson, *Real World Research: A Resource for Social Scientists and Practitioners-Researchers, Second Edition* (Malden, MA.: Blackwell Publishing, 2002), 43, 174.

[138] Ibid., 174.

[139] John W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Los Angeles: SAGE Publications, Inc., 2014), 64, 84.

The survey is designed to measure the students' behaviors, intentions, habits, attitudes, beliefs, and values; behaviors that reflect the general categories of ecological focus defined by LEED; as well as questions that define spaces and places that are a part of the students' regular routines. This study will look for correlational relationships[140] between various variables of the completed surveys using basic multivariate analysis functions.[141] In the initial stages of the analysis, the data from each residence hall will be analyzed separately and in parallel in order to help illuminate differences between the four student groups. The analysis will specifically look for trends in the students' ecological behaviors, attitudes, values, and social conditions that could potentially relate to their daily built environment.

The focus group discussions will follow an outline that is based on LEED categories of ecological focus as well as categories pulled from the Ecological Behavioral Framework for this research (Figure 13, page 42). The transcripts from each residence hall will be coded separately and in parallel, using emerging patterns from all of the data sets to guide the coding process but keeping the outcomes for each student group distinct. Again, the hope is to illuminate differences between the students groups from the four residence halls.

This study will use multiple coding schemes in all stages of the coding process. Special attention will be placed throughout to any mentions of place or aspects of the built environment.

Because this research is complex — comparing four distinct student groups and examining their relationships with their daily built environments through an assessment of their behaviors, behavioral intentions, habits, attitudes, social norms, sense of community at multiple scales, values, worldview, and their connections to spaces and places at various scales — this study will employ simultaneous coding[142] in which more than one coding scheme will be used in most stages of the coding process.

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[140] Robson, *Real World Research*, 155.

[141] Ibid., 432.

[142] Johnny Saldana, *The Coding Manual for Qualitative Researchers* (Los Angeles: SAGE Publications Inc., 2013), 80.

The first stage of coding will begin with concurrent attribute coding and magnitude coding.[143] Attribute coding will be used to gather basic information about the participants and their settings, as well as collate lists of places the students visit and activities they participate in during their normal daily life. Magnitude coding will be used to notate frequency and/or intensity of activities and place visits.

The next cycle of coding will employ structural coding[144] in which a set of codes will be created based on the theoretical framework for this study. For example, the following list will be used as some of the codes for this stage: behaviors, behavioral intentions, habits, attitudes, perceived behaviors controls, social norms, sense of community, values, worldview, and education/knowledge. Also during this cycle, values coding and evaluation coding[145] will be applied. Values coding will address any mentions of attitudes, values, beliefs, and worldview, expressed either as an individual or as a reflection of a social community; while evaluation coding will assess perceptions of merit and worth about policies, opinions, or social norms; and judgements about the quality of places and the students' everyday built landscape.

Versus coding[146] will be used for the next cycle. In this stage any conflicting dichotomies will be noted. Of special note will be any moments where students describe behaving in a way that runs counter to their expressed values or beliefs. This cycle could be significant in highlighting any moments where the built environment inhibits behavioral intentions.

In the next cycle motif and narrative coding[147] will be employed. Motif coding looks for story titles or genres. Narrative coding looks for stories that explain situations or experiences. Both of these coding schemes can help to illuminate settings in which the students see themselves as acting or not acting for reasons out of their control.

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[143] Ibid., 69, 72.

[144] Ibid., 84.

[145] Ibid., 110, 119.

[146] Ibid., 115.

[147] Ibid., 123, 128, 131.

The final cycle of the first stage coding will use provisional and causation coding.[148]

Provisional coding is predetermined coding based on a theoretical framework and though this

study's theoretical framework will have been a focus in a number of the previous cycles of first

stage coding, this final step will use the Ecological Behavioral Framework diagram (Figure 13,

page 42) as an outline and ensure that the concept from every element of the theoretical

framework has been searched for through the raw transcription texts. Causation coding will

seek to answer why certain actions or inactions occurred, and why certain beliefs and attitudes

are held. Coding for this will entail listing antecedent variables, then mediating variables, then

outcomes.

The first stage of coding will conclude with themeing the data followed by an assessment

using code mapping.[149] Themeing the data organizes and categorizes groups of repeating

ideas that emerge from the first stage of coding. Some of these categories will be base on the

provisional codes but hopefully other salient groupings will emerge. Code mapping will

organize the themed groups into relational diagrams and outlines which will help to unify the

theoretical framework and inform the second stage coding cycles.

Second stage coding will be used to organize all of the first cycle codes into categorical,

thematic, conceptual, and theoretical frameworks. Pattern coding[150] will be used to assemble

or group first cycle codes into explanatory units. This cycle addresses reasons — why a

behavior happened, why a student has a certain attitude, etc. Focused coding[151] will be

employed to cluster first cycle codes into salient categories. This process can help to illuminate

factors that lead students to identify themselves as ecologically conscious (or not) or identify

as a part of a group. Axial coding[152] will be used to reorganize and reassemble codes from the

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[148] Ibid., 144, 147, 163.

[149] Ibid., 175, 194.

[150] Ibid., 209.

[151] Ibid., 213.

[152] Ibid., 218.

first cycle, removing redundancies, in order to determine which codes are dominant and most representative of the data.

Theoretical coding and elaborative coding[153] will conclude the second stage coding cycles. Theoretical coding will apply the central themes of the study and work to link all other codes into these themes. Elaborative coding uses previously proven theoretical constructs to reciprocally strengthen the coding and the theory. Both of these coding schemes will employ the Ecological Behavioral Theory Framework (Figure 13, page 42) in order to analyze coding outcomes.

At its core this is a causal-comparative study[154] which will attempt to describe the cause or consequence of differences in ecological behaviors, intentions, habits, attitudes, beliefs, and values between the four students groups by linking behavioral variables to specific aspects of the built environments of the residence halls. The built environment will be addressed using floor plans, maps, and photographs to help link spatial variables to related outcomes from both the survey and the focus groups. Because both community identity and conceptions of place exist as nested systems, this study will explore the relationship between the built landscape and students' ecological behaviors and values at three scales of analysis: at the scale of a residence hall floor, at the scale of a residence hall building, and at the scale of the students' local neighborhood. Outcomes that are supported by both the quantitative and qualitative data sets will be prioritized.

This dissertation is focused on an eco-social approach to sustainability, however other sustainability discourses can overlap and function to support one another. Though LEED, WELL, and biophilic design principles are not central to this research, in the data analysis these other sustainability strategies will be mentioned when addressing relevant aspects of the residence halls' built landscapes.

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[153] Ibid., 223, 229.

[154] Jack R. Fraenkel and Norman E. Wallen, *How to Design and Evaluate Research in Education* (New York: McGraw Hill, 2012), 366.

3.6. Expected Outcomes

This section describes this dissertation's expected outcomes.

This is a comparative case study and this investigation expects to see Cambridge Commons stand out as an example of a successful ecologically responsible built landscape. There are two primary reasons for this assumption. First, Cambridge Commons is LEED gold certified and while the focus of this research differs from LEED and addresses sustainability through a specific eco-social lens, this study expects that LEED designers who are actively cognizant of ecological concerns would make spatial design choices that would tend to align with an eco-social design approach. Therefore, this study expects that Cambridge Commons' built environment is generally supportive of ecological behavioral learning. Second, Cambridge housed the only two ecologically focused LLCs during the timeframe of this study (see Appendix G: Residence Hall LLC Placements, 2016-2017, page 239). It is likely that the student members of these LLCs hold strong ecological values, beliefs, and attitudes which, through social diffusion, make the whole community of Cambridge more likely to reflect positive ecological measures. This exploration hopes that contrasts between Cambridge and the other residence halls will help to illuminate specific spatial qualities of the built landscapes that either support or hinder ecological learning and the growth of an ecologically responsible community identity.

There are two factors that could potentially skew the results of the survey data. First, Sandburg East houses a higher number of sophomore students than any of the other residence halls in this study which all hold primarily freshman. Sophomores will have had an extra year in which to build community connections, explore the city, etc. These experiences and connections could affect a number of behavioral variables as well as their sense of place, community, and education. Because the survey asks the participants which year they are in

school, this factor can easily be assessed and adjusted for through multivariate analysis by examining freshman and sophomore respondents separately, and determining if the students' year in school affects the survey's measured outcomes.

A second factor that could potentially skew the results of the survey data is that all four of the residence halls house LLCs. LLC membership has the potential to affect the students' sense of community in a way that is unrelated to any built landscape factors. Whether a respondent is a member of an LLC is a question in the survey. Again, this factor can easily be assessed and adjusted for through multivariate analysis by examining the results from the LLC students apart from those that are not in LLCs and determining if the outcomes diverge.

One note, the title of both the survey and the focus groups is *Patterns in Daily Life: Readdressing Residence Hall Design.* References to 'ecological,' 'environmental,' and 'sustainable' were purposefully left out of these titles so as to not influence any pool of students who participated in either towards ecologically focused answers.

Though the hope of this study is that the data will lead to some unexpected outcomes, there are a few results that are expected based on the theoretical framework for this research and previous experience in architectural studies:

- As discussed before, this study expects Cambridge to stand out as an example of a successful ecological built landscape. It is expected that Cambridge residents will rate better than students from the other residence halls in variables that relate to their daily life within the building: recycling behaviors, energy use, Ascription of Responsibility, Attitudes, Subjective and Personal Norms, Behavioral Intent; as well as their NEP scale measure.

- Because concepts of community and place are nested systems, there is a likelihood that because Cambridge Commons and Riverview Residence Hall are located off of campus, their students will have experienced more connections with the city and their local neighborhood. This is liable to reflect in the variables that relate to community as well as

variables that relate to an expanded worldview: Awareness of Consequences, Ascription of Responsibility, Attitudes, Subjective and Personal Norms; as well as their NEP scale rating.

- Because Cambridge Commons and Riverview Residence Hall are located off of campus right on the Milwaukee River and include terraces that are adjacent to the major social spaces in their buildings, these students will probably express a greater awareness of local ecological issues.

Beyond these expectations, there are a few built landscape factors that will be a focus of initial data explorations: kitchens, bathroom layouts, access to social spaces on each floor, suites versus traditional room layouts, and factors that affect privacy.

4. Findings

4.1. Findings: Introduction

The Ecological Behavioral Theory Framework for this study is designed to function as a scaffold through which to explore relationships between everyday built landscapes and the learning and support of environmentally sustainable behavior patterns (Figure 13, page 42). This framework is not an absolute representation nor is it comprehensive. A described in Chapter 1, the behavioral settings within a residence hall that relate to the students' ecological behaviors and ecological behavioral-learning involve a complex system of relationships that include, but are not limited to, individual and social identities, daily habits and routines, residence hall spaces and places, normative behavioral influences, as well as the students' general and specific understandings of a variety of ecological situations. This dissertation does not seek to unravel this whole complexity but instead intends to explore specific moments within the relational matrix where the data suggests the built landscape directly or indirectly affects the students' ecological behavioral choices or the growth of their ecological identities.

This chapter will first, address some basic, underlying relationships in order to assess if there are measurable differences between the residence hall students groups' levels of ecological identification, essentially answering: is there grounds for a comparative study? This chapter will then walk through the detailed analyses of the data which follows the general categories defined by the Ecological Behavioral Framework; relationships that link the built environment of the residence halls directly and indirectly to constructions of community, place, and education.

4.2. Findings: Preliminary

This study is founded upon the premise that each of the four residence halls' different built landscapes affect the student residents' experience and that these different experiences result in differing ecological awarenesses and ecological identifications. Therefore the first question that this study must address is: ***Is there a statistically significant difference in the NEP measure of ecological identification between the students groups of the four residence halls?*** This section will walk through basic frequency counts for the survey and focus group data sets, address the demographic data used to define the target student groups, and then evaluate differences in NEP measures for applicable student groupings. Finally, this section will consider a few pre-existing conditions that exist within the residence hall students groupings and address their potential affects on this study.

Residence Hall		Freshman / Sophomore		LLC		Community Floor			Community Building			Community Neighborhood		
		Freshman	Sophomore	Yes	No	High	Mid	Low	High	Mid	Low	High	Mid	Low
Cambridge	40	40	0	33	7	39	1	0	32	8	0	32	8	0
East	34	5	29	1	32	1	33	0	2	28	4	2	26	6
Riverview	39	33	6	9	29	3	15	21	1	11	27	1	14	20
SWN	37	34	3	3	34	2	25	9	0	35	2	0	11	26

Table 1. Survey Frequency Distribution Table.

150 students participated in the online survey in the spring semester of 2017: 40 students from Cambridge, 34 from Sandburg East, 39 from Riverview, and 37 students from SWN. 112 of these participants were freshman at the time of the data collection and 30 were sophomores. 46 of the survey participants were members of LLCs, 102 were not. The total student population in the study's four residence hall categories at the time of data collection was 3416 residents. This means that at a confidence level of 95%, the margin of error for quantitative analysis of the survey data is approximately +/- 8%.

However, this is a mixed-methods comparative case study that has convergent-parallel quantitative and qualitative data sets. In addition to collecting survey data, focus groups were held with students groups from each of the study's four residence halls in the spring semester of 2017. Four students participated in the Cambridge focus group; five students from Riverview; seven from East; and eight students from SWN participated in their focus group discussion. These dialogues lasted an average of one hour and nine minutes and guided students through conversations that addressed the students' daily ecological behavior patterns; attitudes about ecological issues; social forces that influence ecological behaviors and attitudes; as well as discussions about places and spaces that the students inhabit as a part of their regular daily routines. The focus group discussion guideline can be seen in *Appendix C: Focus Group Guideline* (page 234).

Data analysis for this study focuses on outcomes that are supported by both the qualitative and quantitative data sets. Therefore, though the sample size is small, this dissertation's findings show sufficient internal consistency to indicate not only that the residence hall built landscapes do affect the learning of sustainable behavior patterns and the growth of the students' individual and social ecological identities; but also that an eco-social, behavioral design approach to architecturally sustainability is a productive addition to sustainability dialogues in the field of architectural design.

In order to ensure the analysis of the survey data reflects the target students groups, survey item 1: *"Is your current residence hall the first place you have lived as an adult?"*; and item 4: *"Which year in school are you?"* have been used to eliminate any respondents who are not freshman or sophomore students and any respondents who have lived anywhere other than a residence hall as an independent adult. Item 7 in the survey asks the students which of the four residence hall they live in — Cambridge, Riverview, East, or SWN — and this question is used as the predictor variable in these initial inquiries. The response variables are the 12 NEP questions that measure ecological identification and have been shown to possess predictive validity when addressing ecological behaviors: strong NEP measures have been shown to

correlate with pro-ecological behaviors.[155] These questions were set up with 5-point Likert scale response options. Agreement with items 98, 99, 100, 101, 102, 109, and 111; and disagreement with items 103, 104, 105, 106, and 107 indicate pro-environmental attitudes. (See Appendix B: Survey Design, page 226)

Previous studies have shown that the responses to these NEP questions can be reliably combined and the mean value can be used as a single response variable.[156] To test this reliability, this study ran a MANOVA analysis using item 7 (residence hall group) as the predictor variable and all 12 NEP questions as individual response variables; and then conducted a one-way ANOVA, between-subjects design analysis using the single NEP mean response variable. Both analyses produce the same F-ratio and p value and show a statistically significant correlation between the residence hall groups and their NEP ratings: F = 37.29; p < 0.0001 (Table 2 and Table 3). This correlation suggests that there are differences in ecological identity between the students of the four residence halls and that analyses that compare factors that differentiate the four residence halls have the potential to produce statistically significant outcomes: outcomes that can help to explain the differences in ecological identification between the four student groups.

ANOVA Summary Table for Study Investigating the Relationship between: NEP by the Residence Hall Groups					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Residence Hall Groups	3	25.56	8.52	*37.29*	*< 0.0001*
Error	125	28.56	0.23		
C. Total	128	54.12			
N = 129					

Table 2. ANOVA Summary Table for Study Investigating the Relationship between: NEP by the Residence Hall Groups.

[155] Riley A. Dunlap, Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones, "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale," *Journal of Social Issues* 56, no.3 (2000): 425-442.

[156] Ibid., 435.

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and NEP rating							
	mean	Cambridge	East	Riverview	SWN	F Ratio	Prob > F
NEP	2.32	1.75	2.36	2.26	2.94	*37.29*	*< 0.0001*

(1= good, 5= poor)

Table 3. Data from ANOVA Analysis Table for Study Investigating the Relationship between: Residence Halls Groups and NEP rating.

Many of the analyses this study hopes to produce can most effectively be explored by comparing variables between two of the student groups. Some of the following explorations compare students experiences between on-campus and off-campus resident hall groups; some of the following explorations will compare Sandburg East versus Sandburg SWN resident experiences; and some of the analyses will compare Cambridge and Riverview student experiences. This study needs to determine if these examinations can produce statistically significant results by assessing if differences in the NEP measure of ecological identification correlate to each of these residence hall group parings. Therefore this asks the following pairing questions:

First, *are there significant differences between the NEP measure of ecological identification between students who live in a residence hall that is located on-campus versus those that are located off-campus?* Students from Sandburg East Tower and Sandburg South-West-North Towers, all of which are located on campus and share a connecting commons building, were marked as one group. Students from Riverview and Cambridge which are located about two miles south of campus on opposite sides of the Milwaukee River, were marked as a second group. Results using a one-way ANOVA, between-subjects design to examine the correlations between NEP Mean values and these two groups reveals a statistically significant correlation: $F = 54.02$, $p < 0.0001$ (Table 4). This suggests that there are differences in ecological identification between on-campus versus off-campus

student groups and that analyses that compare built landscape factors that differentiate between these students groups have the potential to produce outcomes that can help to explain these differences in ecological identification.

ANOVA Summary Table for Study Investigating the Relationship between: NEP by On and Off Campus Groups					
Source	df	Sum of Squares	Mean Square	F Ratio	Confidence
On and Off Campus Groups	1	16.15	16.15	*54.02*	*0.95*
Error	127	37.97	0.30		
C. Total	128	54.12			
N = 129; *p < 0.0001*					

Table 4. ANOVA Summary Table for Study Investigating the Relationship between: NEP by On and Off Campus Groups.

The next pairing question is: *Are there significant differences between the NEP measure of ecological identification between students who live in Sandburg East versus South-West-North Towers?* Sandburg SWN were all built in 1970 and share the same floor plan. Sandburg East has a different floor plan and was built in 2000. In this analysis, students from Sandburg SWN were marked as one group and students from Sandburg East as a second group. Results using a one-way ANOVA, between-subjects design to examine the correlations between NEP rating and Sandburg East versus SWN student groups reveals a statistically significant correlation: F = 22.63, p < 0.0001 (Table 5). This suggests that an examination of specific built landscape factors that deviate between these two different groups may produce outcomes that can help to explain the differences in ecological identification between the two student groups.

ANOVA Summary Table for Study Investigating the Relationship between: NEP by Sandburg East and Sandburg SWN					
Source	**df**	**Sum of Squares**	**Mean Square**	**F Ratio**	**Confidence**
East and SWN Groups	1	5.09	5.09	*22.63*	0.95
Error	59	13.26	0.22		
C. Total	60	18.34			
N = 61; *p < 0.0001*					

Table 5. ANOVA Summary Table for Study Investigating the Relationship between: NEP by Sandburg East and Sandburg South/West/North.

The final pairing question is: *Are there significant differences between the NEP measure of ecological identification between students who live in Riverview versus students who live in Cambridge?* Riverview Residence Hall was built in 2008 and is located about two miles south of campus on the west bank of the Milwaukee River. Cambridge Commons was built in 2011, is LEED gold certified, and is located about two miles south of campus directly across the Milwaukee River from Riverview, on the river's east bank. Students who live in Cambridge were marked as one group and students from Riverview marked as a second group in this analysis. Results using a one-way ANOVA, between-subjects design to examine the correlations between NEP rating and Riverview versus Cambridge student groups reveals a statistically significant correlation: F = 18.65, p < 0.0001 (Table 6). This suggests that an examination of specific built landscape factors that differ between these two groups has the potential to produce outcomes that can help to explain the differences in ecological identification between these student groups..

ANOVA Summary Table for Study Investigating the Relationship between: NEP by Riverview and Cambridge					
Source	df	Sum of Squares	Mean Square	F Ratio	Confidence
Riverview and Cambridge Groups	1	4.32	4.32	*18.65*	0.95
Error	66	15.30	0.23		
C. Total	67	19.62			
N = 68; *p < 0.0001*					

Table 6. ANOVA Summary Table for Study Investigating the Relationship between: NEP by Riverview and Cambridge.

These survey results, which reflect differences in ecological identification between all of the residence hall student groups of this study, are reflected in focus group responses as well. In general, all of the students that participated in both focus groups and the survey agree that they ought to act in an ecologically positive way. However, analyses from both the survey and the focus group discussions which compare student groups from the different residence halls, often reflect very different ecological behaviors, behavioral intentions, habits, attitudes, perceived social norms, values, and worldview. The initial survey queries, discussed above, show that this study has the potential to uncover statistically significant factors within the built environment of these residence halls that affect the differing ecological identities between the student groups.

There are a few existing conditions within the residence halls that will likely affect this study that need to be acknowledged and addressed. First, this is a comparative case study and this investigation expects to see Cambridge Commons stand out as an example of a built landscape that successfully supports ecological behavioral-learning and the growth of ecological identity within its residents. There are two primary reasons for this assumption. First, Cambridge Commons is LEED gold certified and while the focus of this research differs from LEED and addresses sustainability through a specific eco-social lens, this study expects that

LEED designers who are actively cognizant of ecological concerns would make spatial design choices that would tend to align with an eco-social design approach.[157]

Second, Cambridge housed the only two ecologically focused LLCs during the timeframe of this study. It is likely that the student members of these LLCs hold strong pre-existing ecological values, beliefs, and attitudes which, through social diffusion, make the whole community of Cambridge more likely to reflect positive ecological measures. In order to assess whether LLC membership in Cambridge significantly skews NEP measures of ecological identification for Cambridge as a whole, this study looked at the NEP rating of LLC students and non-LLC students in each of the residence halls. Item 10 of the survey asked students if they are a member of an LLC. Results using a Tukey-Kramer HSD test of one-way ANOVA, between subjects design analysis shows negative values between all LLC and non-LLC pairs within each residence hall. This demonstrates that there is no significant effect differentiating NEP mean ratings between LLC versus non-LLC students within each residence hall (Table 7). As seen previously in Table 3 (page 65), there is a significant difference in the NEP ratings between the four residence hall student groups, and Table 8 shows significant similarity in the NEP rating within each residence hall regardless of whether or not the student belongs to an LLC. Also, the Connecting Letter Report for this analysis shows LLC and non-LLC students within each residence hall as lacking a statistically significant difference (Table 9).

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[157] Cambridge Commons is LEED NC 2.2 Gold Certified and earned 11 of 14 sustainable site credits; 3 of 5 water efficiency credits; 5 of 12 energy and atmosphere credits; 4 of 13 material resources credits; 12 of 15 indoor environmental quality credits; and 5 of 5 innovation in design credits (information supplied by HGA).

ANOVA Summary NEP by LLC Membership in Each Residence Hall Table for Tukey-Kramer HSD Test				
	SWN LLC	**East LLC**	**Riverview LLC**	**Cambridge LLC**
SWN non-LLC	-0.7579			
East non-LLC		-1.2224		
Riverview non-LLC			-0.5892	
Cambridge non-LLC				-0.5634

Positive values show pairs of means that are significantly different.

Table 7. ANOVA Summary NEP by LLC Membership in Each Residence Hall Table for Tukey-Kramer HSD Test.
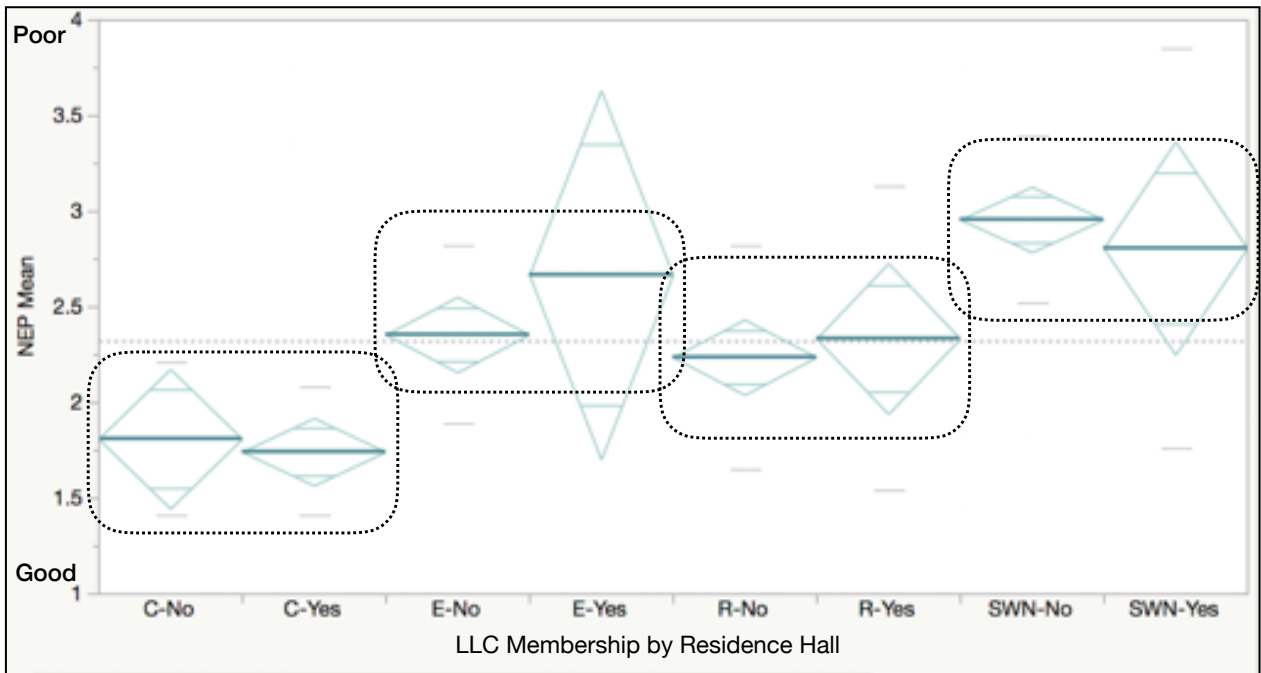
Table 8. ANOVA Summary Chart for Study Investigating the Relationship between: NEP by LLC and Non-LLC Residence Hall Groups.

ANOVA Connecting Letters Report for Study Investigating the Relationship between: NEP Mean by LLC Membership in Each Residence Hall							
C-No	**C-Yes**	**E-No**	**E-Yes**	**R-No**	**R-Yes**	**SWN-No**	**SWN-Yes**
			A		A	*A*	*A*
B		*B*	*B*	*B*	*B*		B
C	*C*		C		C		

Levels not connected by the same letter are significantly different

Table 9. ANOVA Connecting Letters Report for Study Investigating the Relationship between: NEP Mean by LLC Membership in Each Residence Hall.

These analyses show that LLC membership, including LLC membership in Cambridge, is not a variable that significantly alters analyses that compare the students' NEP ratings. This suggests that the community-as-a-whole within each residence hall is what can be statistically explored.

Cambridge does rate significantly better than the other residence halls in measures of students' ecological identification (Table 3, page 65) which suggests that Cambridge offers its students a behavioral setting that actively encourages ecological behavioral learning (including aspects of physical place, place meanings, socially shared conventions, and community norms and values). This study hopes that contrasts between Cambridge, as an ecologically positive behavioral setting, and the other residence halls will help to illuminate specific spatial qualities of the built landscape that help to support ecological learning and the growth of an ecologically responsible community identity.

A second factor that could potential skew the results of this study is that Sandburg East houses a higher number of sophomore students than any of the other residence halls in this study, which hold primarily freshman. Sophomores will have had an extra year in which to build community connections which may affect this study's exploration of the students' sense of community as a factor that relates to ecological behavioral-learning. To address this potential issue, this study ran analyses comparing freshman respondents and sophomore respondents

looking at their mean NEP rating and community measures. The survey included three questions to measure the students' sense of community at three different scales: at the scale of a residence hall floor; at the scale of a residence hall building; and at the scale of the students' local neighborhood:

- item 12 "*Do you consider the students on your residence hall floor a community?*"

- item 13" *Do you consider the students in your residence hall building a community?*"

- item 70 "*To what extant do you consider yourself a part of your local neighborhood community?*"

Responses to these questions were set along a 5-point Likert scale. Each scale is analyzed individually and a mean of these responses is used to produce a general community mean.

All of these analyses show that there is no significant difference between the freshman and sophomore groups. Results using one-way ANOVA, between-subjects designs to examine the correlations between freshman and sophomore students and their NEP rating as well as the students' measures of community, all reveal F-ratios of less than 1, and p values greater than 0.05. This suggests that there is not a statistically significant difference between freshman and sophomore students for the purpose of this study (Tables 10, 11, 12, 13, 14). This means that there is no need for this study to differentiate between freshman and sophomore respondents to the survey.

ANOVA Summary Table for Study Investigating the Relationship between: NEP Mean by Freshman / Sophomore					
Source	df	Sum of Squares	Mean Square	F Ratio	Confidence
Freshman / Sophomore	1	0.03	0.03	*0.06*	0.95
Error	127	54.09	0.43		
C. Total	128	54.12			
N = 129; *p < 0.8018*					

Table 10. ANOVA Summary Table for Study Investigating the Relationship between: NEP Mean by Freshman / Sophomore.

ANOVA Summary Table for Study Investigating the Relationship between: Community Mean by Freshman / Sophomore					
Source	df	Sum of Squares	Mean Square	F Ratio	Confidence
Freshman / Sophomore	1	0.30	0.30	*0.18*	0.95
Error	134	218.97	1.63		
C. Total	135	219.26			
N = 136; *p < 0.6695*					

Table 11. ANOVA Summary Table for Study Investigating the Relationship between: Community Mean by Freshman / Sophomore.

ANOVA Summary Table for Study Investigating the Relationship between: Floor Community by Freshman / Sophomore					
Source	df	Sum of Squares	Mean Square	F Ratio	Confidence
Freshman / Sophomore	1	1.85	1.85	*0.90*	0.95
Error	133	273.59	2.06		
C. Total	134	275.44			
N = 135; *p < 0.3445*					

Table 12. ANOVA Summary Table for Study Investigating the Relationship between: Floor Community by Freshman / Sophomore.

ANOVA Summary Table for Study Investigating the Relationship between: Building Community by Freshman / Sophomore					
Source	**df**	**Sum of Squares**	**Mean Square**	**F Ratio**	**Confidence**
Freshman / Sophomore	1	0.40	0.40	*0.23*	0.95
Error	134	237.71	1.77		
C. Total	135	238.12			
N = 136; *p < 0.6343*					

Table 13. ANOVA Summary Table for Study Investigating the Relationship between: Building Community by Freshman / Sophomore.

ANOVA Summary Table for Study Investigating the Relationship between: Neighborhood Community by Freshman / Sophomore					
Source	**df**	**Sum of Squares**	**Mean Square**	**F Ratio**	**Confidence**
Freshman / Sophomore	1	0.08	0.08	*0.03*	0.95
Error	131	313.48	2.39		
C. Total	132	313.56			
N = 133; *p < 0.8559*					

Table 14. ANOVA Summary Table for Study Investigating the Relationship between: Neighborhood Community by Freshman / Sophomore.

The underlying research question of this study is: "*How, and to what extent, does the built landscape of these four residence halls affect the environmentally significant behaviors and behavioral-learning of the residence hall residents?*" Each stage of the following exploration will follow the Ecological Behavioral Framework categories and focus first on community, then on place, and finally on education (Figure 13, page 42). Inquiries are lead by the outcomes of initial focus group coding, survey data analyses, as well as hunches formed from a background in architectural design. Some of the following analyses will address all four of the residence hall groups while other analyses will focus on a contrasting pair of residence hall student groups.

At the core of architectural design is the concept that actions and spaces are indivisible. Repeated actions and behaviors are anchored in place and these actions and activities are often made explicit in and by the built landscape.[158] This research hopes to highlight moments in the daily lives of residence hall residents where the built landscape can help support ecologically positive behaviors and through this, help ecological behavioral-learning and support the growth of the students' ecological identities. The following investigations will explore what differentiates the settings which hold good sustainable behaviors with those that hold bad behaviors.

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[158] Christopher Alexander, *The Timeless Way of Building,* (New York: Oxford University Press, 1979): 69-73.

4.3. Findings: Community
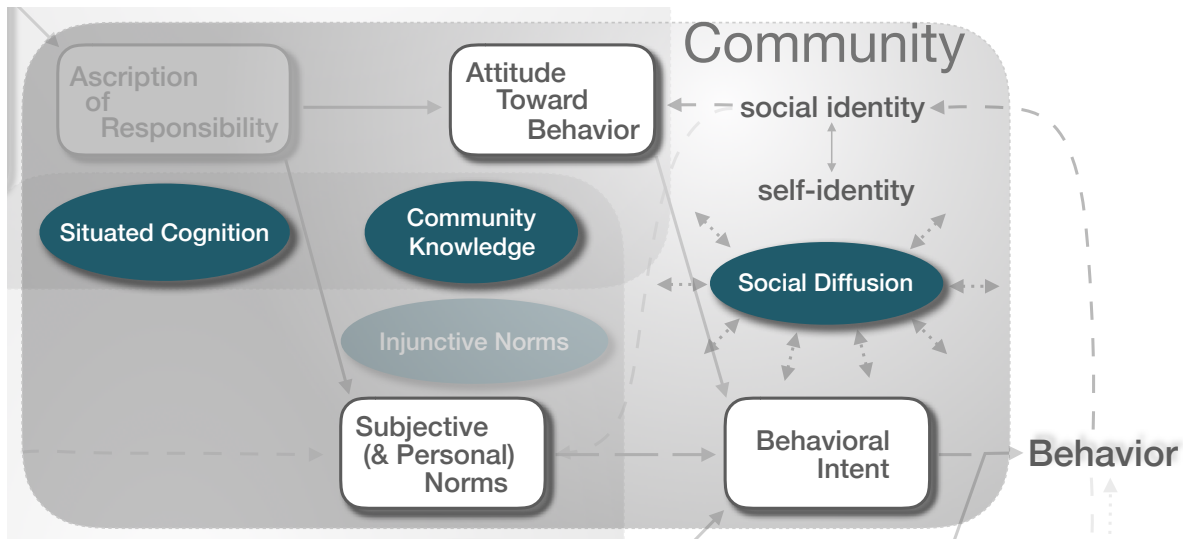
Figure 16. Community in the Ecological Behavioral Framework (Detail).
Based on the work of Figures 8 through 12 and their corresponding sections.
Embedded in the Ecological Behavioral Framework are components that relate directly to concepts of Community including but not limited to Social Diffusion and Normative Influence (also: attitudes, norms, intentions as well as theories of communities of practice, situated cognition, behavior settings).

As discussed in Chapter 2.5. Community and Identity Theory (page 34-38), the problem of environmental sustainability is, at its core, a social issue.[159] Progress towards sustainability can be achieved through incremental shifts in everyday personal behaviors and the ecological impact of the production and reproduction of daily lives.[160] Students who move into residence halls in their first year of college tend to adopt the ideological values of their group as they become socialized in their new environment. In this way, social networks have a powerful influence on behavior through shared values, expectations, and social norms.[161] This process is known as social diffusion and the normative influence of this type of a close community — close both physically and in that students perceive other residence hall residents as similar to themselves — is based on social interaction as well as the observation of others' behaviors, and is inordinately more powerful than influence from any other social or informational

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[159] Gough and Scott, "Promoting Environmental Citizenship through Learning," 269.

[160] Dobson, *Citizenship and the Environment,*, 119.

[161] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 159; Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 14.

sources.[162] Behaviors are performed within social and physical environments that suggest which actions are appropriate and expected.[163] The influence of the built environment in a place that holds the daily lives of these communities has the potential to play a significant role in the formation and support of ecological behavior patterns (Figure 16).

Analysis run using a one-way ANOVA, between-subject design to examine the residence hall student groups by community mean measure produces an F-ratio of 144.75 with a $p < 0.0001$. This suggests that there is a strong statistically significant correlation between residence hall group and their sense of community (Table 15).

ANOVA Summary Table for Study Investigating the Relationship between: Community Mean by Residence Hall Group					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Community Measure	3	168.15	56.05	*144.75*	*< 0.0001*
Error	132	51.11	0.39		
C. Total	135	219.26			
N = 136					

Table 15. ANOVA Summary Table for Study Investigating the Relationship between: Community Mean by Residence Hall Group.

This study hypothesizes that a strong sense of community contributes to the formation of an ecological identity and that the conditions of the built landscape of a residence hall play a role in the growth of this community. Therefore this first section of analyses focuses on the relationships between the students' sense of community and their ecological identities. In order to explore this relationship further this study must first ask: *To what extent and at what scale does students' sense of community affect their ecological behaviors and ecological behavioral-learning?* In order to address this question this study ran correlational analyses

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[162] Doug Mckenzie-Mohr, *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing*, 3rd edition (Gabriela Island, BC: New Society Publishers, 2011), 63, 73.

[163] Roger G. Barker and Herbert F. Wright, "Psychological Ecology and the Problem of Psychosocial Development," *Child Development* 20, no.3 (September 1949): 136-137.

between the students' NEP ratings and community measures — both the general community mean and the community measures at the floor, building, and neighborhood-scales.

Results using a one-way ANOVA, between-subjects design reveals a statistically significant correlation between respondents' sense of general community and their NEP rating: $F = 35.19$, $p < 0.0001$ (Table 16 and Table 17). This suggests that there is a difference between the four students groups' sense of community that correlates to differences in their NEP measures and that an examination of specific built landscape factors that affect the students' sense of community may help to explain differences in ecological identification between the student groups.
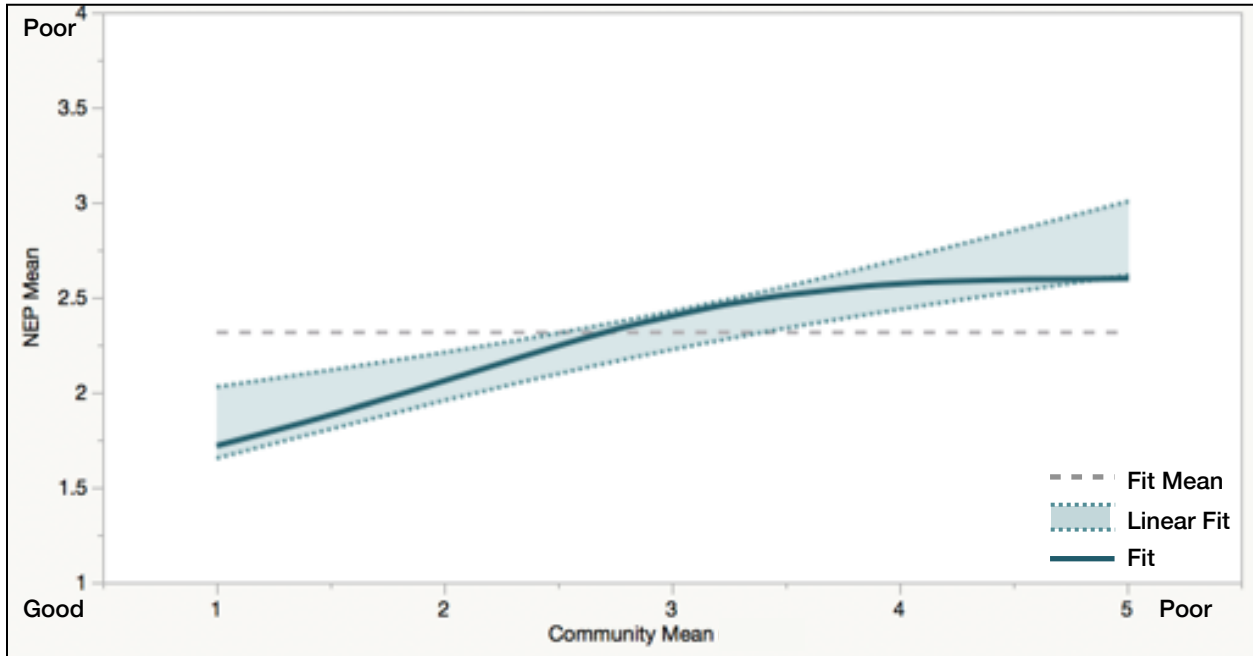
Table 16. ANOVA Summary Chart for Study Investigating the Relationship between: NEP by Community Mean.

ANOVA Summary Table for Study Investigating the Relationship between: NEP by Community Mean					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Community Measure	1	11.74	11.74	*35.19*	*< 0.0001*
Error	127	42.38	0.33		
C. Total	128	54.12			
N = 129					

Table 17. ANOVA Summary Table for Study Investigating the Relationship between: NEP by Community Mean.

The results of the correlation between general community measure and NEP rating are supported by analyses at each of the three scales of community queried in this study. At the scale of a residence hall floor, the correlation between NEP rating and floor-scale community is statistically significant. Results using a one-way ANOVA, between-subjects design to examine this correlation reveal statistical significance: $F = 23.53$, $p < 0.0001$ (Table 18).

ANOVA Summary Table for Study Investigating the Relationship between: NEP by Floor Community					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Floor Community Measure	1	8.50	8.50	*23.53*	*< 0.0001*
Error	126	45.50	0.36		
C. Total	127	53.00			
N = 128					

Table 18. ANOVA Summary Table for Study Investigating the Relationship between: NEP by Floor Community.

The correlation between student residence hall groups and floor-scale community is also statistically significant. Results using a one-way ANOVA, between-subjects design to examine this correlation produce: $F = 79.48$, $p < 0.0001$ (Table 19).

ANOVA Summary Table for Study Investigating the Relationship between: Floor Community by Residence Hall					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Residence Hall Groups	3	177.77	59.26	*79.48*	*< 0.0001*
Error	131	97.67	0.75		
C. Total	134	275.44			
N = 135					

Table 19. ANOVA Summary Table for Study Investigating the Relationship between: Floor Community by Residence Hall.

These floor-scale community statistical correlations suggest that examinations of specific built landscape elements that differ between the residence hall groups and affect the students' daily social behavior patterns on the residence hall floors can produce outcomes that relate to their ecological identity.

At the scale of a residence hall building, the correlation between NEP rating and building-scale community is again statistically significant. Results using a one-way ANOVA, between-subjects design to examine this correlation reveal statistical significance: F = 20.53, p < 0.0001 (Table 20).

ANOVA Summary Table for Study Investigating the Relationship between: NEP by Building Community					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Building Community Measure	2	13.30	6.65	*20.53*	*< 0.0001*
Error	126	40.81	0.32		
C. Total	128	54.12			
N = 129					

Table 20. ANOVA Summary Table for Study Investigating the Relationship between: NEP by Building Community.

The correlation between student residence hall groups and building-scale community is also statistically significant. Results using a one-way ANOVA, between-subjects design to examine this correlation produce: $F = 86.61$, $p < 0.0001$ (Table 21).

ANOVA Summary Table for Study Investigating the Relationship between: Building Community by Residence Hall					
Source	**df**	**Sum of Squares**	**Mean Square**	**F Ratio**	**Prob > F**
Residence Hall Groups	3	157.90	52.63	*86.61*	*< 0.0001*
Error	132	80.21	0.61		
C. Total	135	238.12			
N = 136					

Table 21. ANOVA Summary Table for Study Investigating the Relationship between: Building Community by Residence Hall.

These building-scale community statistical correlations suggest that examinations of specific built landscape elements that differ between the residence hall groups at the scale of the residence hall buildings and affect the students' daily social behavior patterns can produce outcomes that can help to explain differences in the students groups' ecological identities.

At the scale of the residence halls' neighborhoods, the correlation between NEP rating and neighborhood-scale community is again statistically significant. Results using a one-way ANOVA, between-subjects design to examine this correlation reveal statistical significance: $F = 46.24$, $p < 0.0001$ (Table 22).

ANOVA Summary Table for Study Investigating the Relationship between: NEP by Neighborhood Community					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Neighborhood Community Measure	1	14.44	14.44	*46.24*	*< 0.0001*
Error	127	39.67	0.31		
C. Total	128	54.12			
N = 129					

Table 22. ANOVA Summary Table for Study Investigating the Relationship between: NEP by Neighborhood Community.

The correlation between student residence hall groups and their sense of neighborhood-scale community is also statistically significant. Results using a one-way ANOVA, between-subjects design to examine this correlation produce: F = 74.28, p < 0.0001 (Table 23).

ANOVA Summary Table for Study Investigating the Relationship between: Neighborhood Community by Residence Hall					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Residence Hall Groups	3	198.59	66.20	*74.28*	*< 0.0001*
Error	129	114.97	0.89		
C. Total	132	313.56			
N = 133					

Table 23. ANOVA Summary Table for Study Investigating the Relationship between: Neighborhood Community by Residence Hall.

These neighborhood-scale community statistical correlations suggest that examinations of specific built landscape elements that differentiate between the residence hall groups and affect the students' daily social behavior patterns with in their local neighborhoods can produce results that may help to explicate differences between the students groups' ecological identities.

The survey design includes sets of questions meant to measure the elements that make up this study's Ecological Behavioral Framework (Figure 13, page 42; and Appendix B, page 226):

- Awareness of Consequences: agreement with items 90, 92, 94, 95, 96, 97, 98, 99, 100, 101, 102, 107, 109, and 111; and disagreement with items 91, 93, 103, 104, 105, 106, 108, and 110 indicate pro-environmental awareness.

- Ascription of Responsibility: agreement with items 82; and disagreement with items 80, and 83 indicate a pro-environmental sense of responsibility.

- Attitude Toward Behavior: agreement with items 73, 74, 75, and 81 indicate pro-environmental attitudes toward behavior.

- Behavioral Intent: agreement with items 21, 25, 28, 32, 40, 41, 42, 43, 48, 49, 55, 59, and 88; and disagreement with items 23, 39, and 61 indicate pro-environmental behavioral intentions.

Results using a one-way ANOVA, between-subjects design to examine the correlations between the students' sense of community at all of the scales of this study and the mean value of each of the Ecological Behavioral Framework elements produces a supportive trend. At each scale, the measure of the students' sense of community is correlated most strongly with the three elements that the theoretical framework posits ought to be correlated with community: Attitude Toward Behavior; Norms; and Behavioral Intent (Table 24, Figure 13, page 42). This suggests that the theoretical foundation for this study is solid and can be practically applied to explore these relationships.

F-Ratio Table for the Relationship between:				
	Community Mean	**Floor-Scale Community**	**Building-Scale Community**	**Neighborhood-Scale Community**
Awareness of Consequences	12.90	22.47	18.92	25.72
Ascription of Responcibility	7.89	12.75	16.23	15.81
Attitude Toward Behavior	*21.46*	*32.29*	*25.52*	*47.36*
Norms	*21.92*	*44.51*	*39.88*	*72.61*
Behavioral Intent	*23.97*	*40.00*	*29.35*	*52.43*

Table 24. F-Ratio Table for Relationships between various Community scales and Ecological Behavioral Theory framework elements.

All of the preceding community correlation results support the hypothesis that an examination of built landscape factors that affect the students' sense of community can produce statistically significant results which can help to explore differences in the student groups' ecological identities and help to uncover productive design suggestions.

The leading research question for the community section of the data analysis is: *What aspects of the built environment help or hinder the growth of the students' sense of community?*

Though data suggests that neighborhood-scale community is most correlated to the students' NEP rating (Table 22, page 82), a large-scale sense of community cannot be maintained without its members being grounded in smaller-scale, nested communities that, in the case of residence halls and for the purpose of this dissertation, act at the floor-scale and at the building-scale.[164] Analyses at these scales also show statistically significant correlations with the students NEP ratings (Table 18, page 79; Table 20, page 80).

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[164] Jung-Hye Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort: A Process-Oriented and Contextually Sensitive Theoretical Framework," *Journal of Environmental Psychology* 45 (March 2016): 12; Sim Van Der Ryn and Murray Silverstien, *Dorms at Berkeley: An Environmental Analysis,* (U.S. Department of Health, Education and Welfare: Office of Education, 1967), 41.

Therefore the next sections of this study will analyze the student groups' sense of community in relation to aspects of the built landscape of the residence halls at three scales of analysis: first, at the floor-scale where aspects of the built environment of the students' rooms, suites, and floors will be addressed; second, at the building-scale where elements of the built landscape such as the buildings' amenities and social spaces will be explored; and finally, at the neighborhood-scale where the buildings' locations will be considered in relation to the students' sense of local community. All of these scales will be studied through the lens of the ecological behavioral framework and based on theory that suggests that the students' sense of community has the potential to affect their ecological behavioral-learning and the growth of their ecological identities.

4.3.1. Findings: Community — Residence Hall Floor

Some of the focus group discussions highlight differences between the groups' perceptions of normal social behaviors that suggest that the students' sense of community does play a significant role in their daily ecological behaviors. Students who live in Sandburg East and Cambridge both state that they feel responsible for their suite-mates' recycling behaviors and will sometimes encourage their suite-mates to recycle if they are not already (Table 25). One East resident said "My suite, we get on each other. We'll be like 'who put this in the can and didn't take it out?'" A Cambridge student described:

> I would actually stay stuff to people. I guess I wouldn't like yell at them, but I'd be like "hey, wouldn't it be nice for you to actually put things in the right place." So I guess that'd be like my way of just like jabbing at somebody. But I would definitely acknowledge if somebody would put something in wrong place or just completely miss the trashcan or recycling bin at all.

Cambridge and Sandburg East students also both rate better than the mean value to survey question 76: "*If I DID NOT separate recycling from the rest of the trash, I would feel guilty*;" and

Cambridge students rate better than the mean value to survey question 78: "*I would judge someone negatively if they DID NOT separate their recycling from the rest of their trash*." (Table 26) This sense of responsibility towards and for others is indicative of community cohesion and suggests that the daily environments in Cambridge and in Sandburg East support the growth of floor-scale community.

Data tabulated from Focus Group Provisional and Hypothesis Coding				
	Cambridge	**East**	**Riverview**	**SWN**
Encourages other to recycle	II	I		I
Responsible for suite-mates' behaviors	II	III		I
Prioritizes social conformity / "won't rock the boat"			IIII	IIIII
Responsible only for self	I	I	IIIII II	II

(number of times expressed - Focus Group Hypothesis Coding)

Table 25. Focus Group Tabulation of expressions of Ecological Social Norms.

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Responses to survey questions 76 and 78					
	mean	**Cambridge**	**East**	**Riverview**	**SWN**
If I DID NOT separate recycling from the rest of the trash, I would feel guilty	2.00	1.31	1.92	2.06	2.75
I would judge someone negatively if they DID NOT separate their recycling from the rest of their trash	2.79	1.65	2.81	2.87	3.97

(Survey questions 76 and 78) (1= good, 5= poor)

Table 26. Data from ANOVA Analysis Table for Study Investigating the Relationship between: Residence Halls Groups and Responses to survey questions 76 and 78. Measures of social responsibility.

In the focus groups, students from Riverview and Sandburg SWN repeatedly echoed the motif "*I don't want to rock the boat*." Students from these residence halls seem to prioritize

social conformity over actions that could affect change in others and tend to act ecologically only when it aligns with existing social norms. These students communicated that they feel responsible only for their own behavior and do not feel social pressure to behave in an ecologically positive way (Table 25). A SWN student described, to general agreement, "I don't really see all the people on my floor all that often. I'm not going to go up to them and be like 'did you recycle today?' I'm not going to do that. I don't want to be that guy. It's not my business." Students from Riverview and SWN both rate more poorly than the mean to survey question 76: "*If I DID NOT separate recycling from the rest of the trash, I would feel guilty;*" and question 78: "*I would judge someone negatively if they DID NOT separate their recycling from the rest of their trash*" (Table 26). In Riverview and SWN, the students' lack of social responsibility as well as their prioritization of social conformity over actions that align with their personal values (see page 68 - all student participants of the survey and the focus groups agree that they ought to act in an ecologically positive way) is suggestive of environments that are not conducive to the growth of community at the floor-scale.

In Cambridge and East, students generally speak positively about their sense of floor-scale community. For example, one resident of Cambridge described:

> I feel like, I know a lot, *a lot* of people here, I know almost everybody on this floor with the exception of I want to say like 10 people. And I feel that, I've gotten to know quite a few people on my floor pretty well. … Yeah, I feel like even times I like get upset, like I had a problem with my homework or whatever and I just went down the hall into a friends room and they helped me fix the problem, listen to my problems, and helped me with other ones. Everybody is like that here in Cambridge.

Students who live in SWN and Riverview tend to speak more negatively about their residence hall floor's community. A SWN resident described "Hardly anybody knows anyone outside of their room, because nobody goes out and talks to anybody. Like the people in the RA's room, like, the girls are talkative I guess, but other than that I hardly know anyone there. If there was a big group meeting I would know no one." Another student agreed with this and added "I really barely know anybody on my floor to be honest." In the Riverview focus group, a

student explained "It doesn't feel like a community much because no-one really talks to each other unless they're doing like a project for class together. So it really doesn't feel that much like a community even though there are like events that are supposed to be directed towards us."

An examination using one-way ANOVA, between-subjects design to compare correlations between each residence hall student group and their sense of floor-scale community show very different mean values for each students group (Table 27).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Floor Scale Community Measure					
	mean	Cambridge	East	Riverview	SWN
Measure of Floor Scale Community	2.75	1.05	3.00	3.94	3.34

(Survey question 12) (1= good, 5= poor) $F = 79.48$, $p < 0.0001$

Table 27. Data from ANOVA Analysis Table for Study Investigating the Relationship between: Residence Halls Groups and Floor-scale Community Measure.

Focus group coding also reflects a great deal of variation between the groups in their positive and negative descriptions of their floor-scale community (Table 28).

Data tabulated from Focus Group Provisional and Hypothesis Coding				
	Cambridge	East	Riverview	SWN
Good Floor Community	IIII	II		II
Bad Floor Community			IIIII I	II

(number of times expressed - Focus Group Hypothesis Coding)

Table 28. Focus Group Tabulation of expressions of Floor Community.

These analyses support the assessments from the focus groups and survey questions 76 and 78 that Cambridge students have a strong sense of floor community; East students have a good sense of floor community though not as strong as the Cambridge students; and SWN

and Riverview students do not feel strong social ties on their residence hall floors. Feelings of social isolation can lend to a sense of inefficacy when it comes to ecological behaviors, where as strong social ties can encourage and support ecologically responsible behavioral norms and the growth of an ecological social identity.[165]

These differences in residence hall floor community can potentially be attributed to disparate aspects of the residence halls' built environments. The following discussions are lead by research questions that will examine attributes of the residence hall environments that can potentially affect the students' ability to build and maintain a sense of community on their residence hall floor.

Not only does a sense of community exist as a nested system (as discussed in the Chapter 2.5. Community and Identity Theory on page 34-38) in which a person needs a small, close-knit social group to feel comfortable belonging to a larger group identity;[166] individuals also need to be able to retreat away from social in order to feel comfortable being social. As Christopher Alexander states, "No one can be close to others, without also having frequent opportunities to be alone."[167] Floor-scale community starts with individual comfort and the four residence halls in this study have very different built landscape conditions relating to privacy. The focal point of a student's privacy in a residence hall is their room.[168] This space is their only opportunity to retreat away from the social life of the residence hall floor. Essential to a sense privacy within a student's room is a buffer zone, or privacy gradient, that separates the student's room from the social spaces of the residence hall floor.[169]

This study proposes that the students' sense of privacy in the residence halls may have an effect on the their ability to form a close-knit community, and through this, affect their

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[165] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 159, 175-176.

[166] Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 12.

[167] Christopher Alexander, Sara Ishikawa, and Murray Silverstein, *A Pattern Language: Towns, Building, Construction* (New York: Oxford University Press, 1977), 669.

[168] Van Der Ryn and Silverstein, *Dorms at Berkeley*, 31.

[169] Ibid., 74.

opportunities for ecological behavioral-learning. The first community-based research question looking at floor-scale community is: ***Are there significant differences in students' sense of community on the residential floors of the residence halls between students who live in suites that have good privacy gradients versus suites with poor privacy gradients?***

Students in the focus groups from SWN and Riverview repeatedly mentioned that their rooms are the primary location where they socialize with their friends. When asked where they usually hang out with friends Riverview students said, "People hang out in their rooms." "Oh you know, sometimes in like some people's rooms, and other people's rooms." and "I go like to my friends room sometimes." When discussing the students' sense of privacy one SWN students explained "I think, because our rooms are generally places where people like to come, to our rooms, so when we want to chill out and sort of Zen out and focus on other things and not socialize, that kind of makes it difficult." Using their rooms as a social space, as semi-public space, runs counter to any sense of privacy students are supposed to experience in their room.

In Cambridge, only one student mentioned socializing in their room, and no-one from East (Table 29). This suggests that there is difference that exists between Riverview and SWN on the one hand, and Cambridge and Sandburg East on the other.

Data tabulated from Focus Group Hypothesis Coding				
	Cambridge	**East**	**Riverview**	**SWN**
Rooms used as social space	I		IIII	II
Rooms as bad places for privacy			I	II
Rooms as good places for privacy	I	I		

(number of times expressed - Focus Group Hypothesis Coding)

Table 29. Focus Group Tabulation of expressions of Room Privacy

Looking at the floor plans of the four residence halls, differences in privacy gradients are apparent (Figure 17). In Cambridge and in East there are zones of semi-public and semi-private function that lie between the fully public spaces of the floor and the private spaces of the individual rooms. Students of Cambridge and East have spaces where they can socialize that are semi-private yet still outside of their room. In Riverview and SWN these buffer zones are significantly reduced. Riverview does not have a semi-public zone at all and in SWN the semi-public and semi-private zones are relatively small.
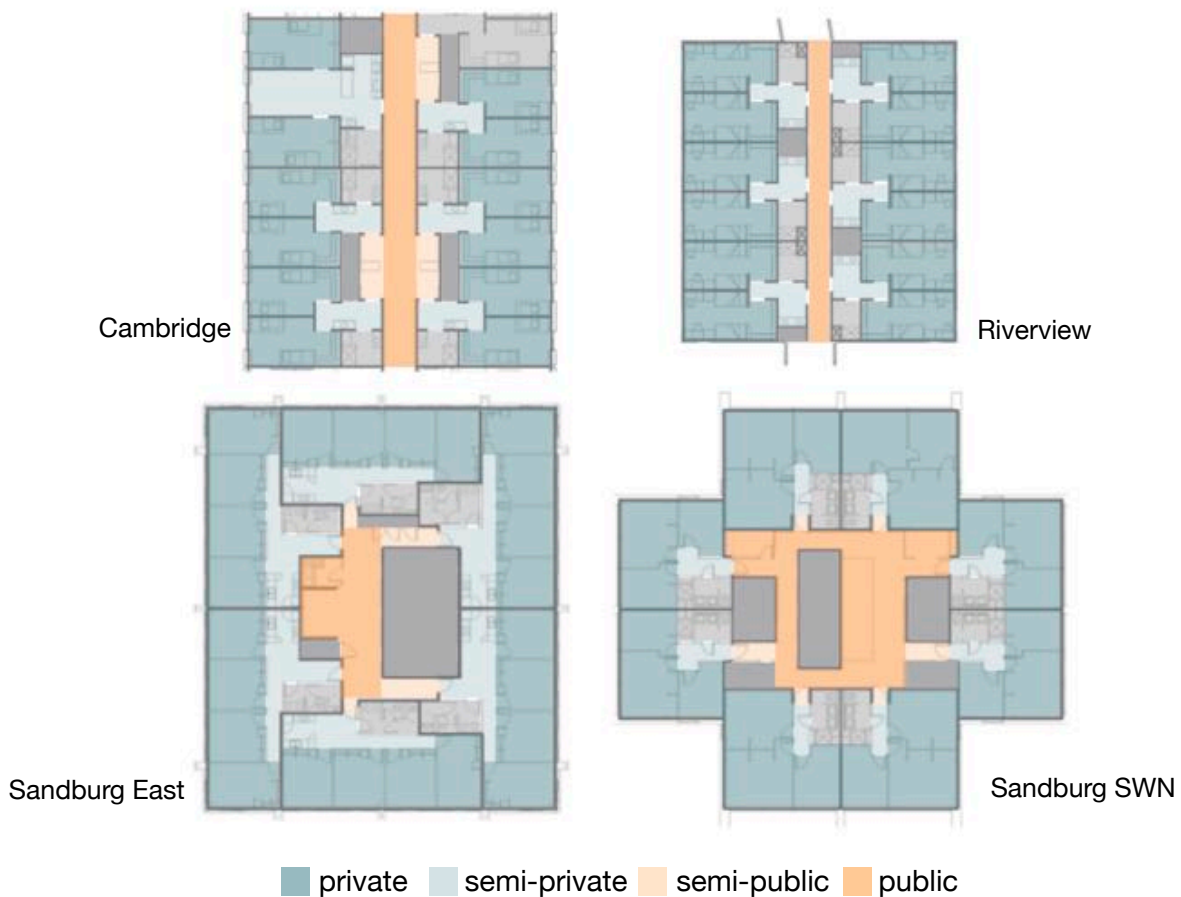
Figure 17. Residence Hall Privacy Gradients.

To highlight how these differences would experientially play out, Figure 18 illustrates the differences between Riverview and Cambridge.

Riverview   Cambridge
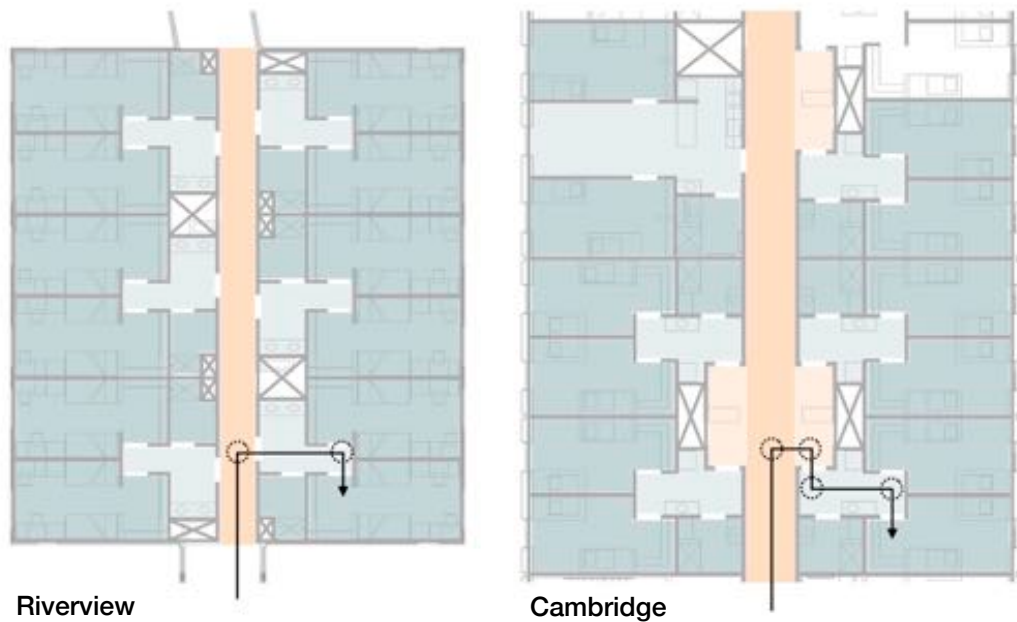
Figure 18. Riverview and Cambridge Privacy Gradients.

In Riverview, students moving from the public space of the hallway must turn twice, passing

through the semi-private common zone within their suite, to enter the private space of their

room. In Cambridge, a student must turn four times, passing first through a semi-public

hallway nook and then through the semi-private common zone within the suite, to enter their

private room. This difference may seem subtle but is significant. In Cambridge, the transition

from public to private is called out both through a series of spaces that graduate in privacy, as

well as a series of changes in orientation.[170] In Riverview, the transition is minimized by the

straight shot from the hallway to the room door and the lack of any semi-public zone as a part

of the transition.

These privacy gradient conditions echo the measure of floor-scale community where

Cambridge and East rate better than Riverview and SWN (Table 27, page 88). The lack of social

gradient in Riverview and SWN can make it difficult to control and define degrees of shared

space and therefore can make all social interactions more awkward.[171] In Riverview and

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[170] Alexander, Ishikawa, and Silverstein, *A Pattern Language*, 552.

[171] Ibid., 610.

Sandburg SWN the growth of floor-scale community is potentially hindered by this lack of graduated privacy, which in turn can potentially hinder the social growth of the students' ecological identity.

A sense of community starts with a small, close-knit social group.[172] In residence hall life, where students often know no-one at the beginning of the academic year, this small social group often starts with suite-mates. This study postulates that having a semi-private space within the suite where suite-mates can comfortably socialize and bond is an essential foundation to the growth of a sense of community within a residence hall and is therefore potentially a factor in the growth of a student's ecological identity.[173] In order to assess if in-suite commons areas help social bonding within a suite, this study asks: ***Are there significant differences in the sense of community between students that have in-suite social common areas and not?***

There are significant differences in both the size and quality of the semi-private suite areas between the four residence halls (Figure 19). In Cambridge there are two kind of suites, regular suites and larger suites that include a kitchen and living room-like central space. An average floor plan has 30 regular suites and 8 large suites. Each suite holds 4 students. The regular suite in Cambridge has approximately 78 sqft of common space (19.5 sqft per students) and the large suites have approximately 310 sqft of common suite space (77.5 sqft per students). This averages to 32 sqft of common suite space per Cambridge resident. In East all of the suites have a common kitchen and average 29 sqft of common space per student. In Riverview the suites have an entry vestibule and average 17 sqft of common space per student. In SWN suites have a small entrance area and average 12 sqft of common space per student (Table 30).

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[172] Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 12.

[173] Alexander, Ishikawa, and Silverstein, *A Pattern Language*, 620.
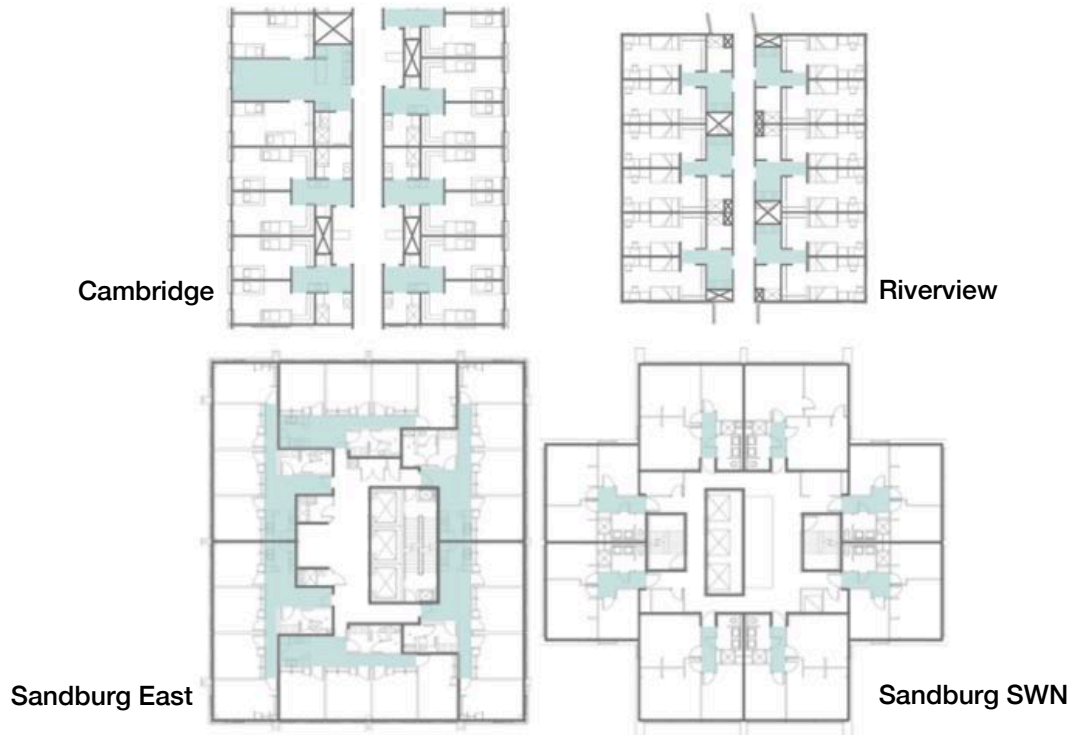
Figure 19. Residence Hall Suite Commons.

	Mean Floor-Scale Community	Average Suite Commons Space per Student sqft
Mean	2.75	
Cambridge	1.05	32
East	3.00	29
Riverview	3.94	17
SWN	3.34	12

F Ratio = 79.48, p < 0.0001 (1 = good, 5 = poor)

Table 30. Data from ANOVA Analysis Table and Floor Plans: Floor-Scale Community Measure and Suite Commons Square Footage.

Cambridge and East both offer their residents in the range of 30 sqft per student, and SWN and Riverview less than 20 sqft per student. This fits with the measure of floor-scale community in that Cambridge and East rate better than Riverview and SWN, suggesting that

in-suite commons may play a significant role in the social bonding that happens within a residence hall suite. This is supported by a statement an East student made in his focus group: "I get along and am really good friends with my suite mates. Definitely a lot community within the suite."

Kitchens can function as a focus for informal social activities on a residence hall floor. Communal eating and cooking brings people together and increases feelings of group membership.[174] This study proposes that kitchens can work as a spatial foundation for the building of floor-scale community within a residence hall and can therefore have an effect on the social growth of the students' ecological identities. This study asks: ***Are there significant differences in the sense of community between students who have easy access to kitchens and those that don't?***

In Cambridge, on an average floor, 8 of the 38 suites have kitchens and there is a common kitchen in each main floor lounge that any student can use. Sandburg East has a kitchen in every suite. In the focus group discussions students in Cambridge and East often mentioned kitchens as the focus of social activities. Cambridge students describe the common kitchen at the center of the floor as well used; "My suite uses it a lot, there's always people in the kitchen. And we also use it as a gathering space… A lot." One student in the East focus group described taco nights as a regular occurrence where students from his floor would gather and cook and socialize: "Our entire floor uses it, to the point where we like take our common table, we have taco nights like… So like I've actually had to take my suite's table, move it to the suite across the hall, and then like we had a longer table and like just we had tacos."

Riverview and SWN students do not have easy access to a kitchen space. Riverview residence hall offers students one kitchen in the whole building. It is located on a lower level and students have to sign in and reserve that space. Riverview students describe the kitchen

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[174] Alexander, Ishikawa, and Silverstein, *A Pattern Language*, 698; Van Der Ryn and Silverstein, *Dorms at Berkeley*, 55.

as "inaccessible" and the reservation policies as "a pain" and "restrictive." There is no kitchen in SWN for student use.

A one-way ANOVA, between-subject design analysis of the students' sense of floor community by kitchen access shows a strong statistical correlation with a large F-ratio: F = 90.70, p < 0.0001 (Table 31 and Table 32) which indicates that there is a correspondence between students who have access to kitchens and those that report high levels of floor-scale community in the survey. This suggests that kitchen access may play a significant role in community building both in Cambridge and East. While the lack of kitchen access in Riverview and SWN doesn't necessarily account for their poor floor-scale community measures, it certainly doesn't help.

ANOVA Summary Table for Study Investigating the Relationship between: Floor Community by Kitchen Access					
Source	df	Sum of Squares	Mean Square	F Ratio	Confidence
Kitchen Access	1	111.68	111.68	*90.70*	0.95
Error	133	163.76	1.23		
C. Total	134	275.44			
N = 135; *p < 0.0001*					

Table 31. ANOVA Summary Table: Floor Community by Kitchen Access.

Data from ANOVA Summary Table for Study Investigating the Relationship between: Floor Community by Kitchen Access			
	mean	Kitchen Access via Suite or Floor	Kitchen Access limited in Building or no access
Measure of Floor Scale Community	2.75	1.82	3.64

(Survey questions 12 and 33) (1= good, 5= poor)

Table 32. Data from ANOVA Analysis Table: Floor-Scale Community and Kitchen Access.

Focus group discussion analysis supports the survey data analysis (Table 33). A tabulation of moments in the discussions where students mentioned kitchens in relation to feelings of community and activities that involve community bonding shows Cambridge and East students often mentioned kitchens as a part of their daily lives. This is where a good deal of socializing happens: some students snack and study, some students have reoccurring events involving food and eating. While it doesn't seem to occur to SWN students to think negatively about not having a kitchen, Riverview students expressed a good deal of frustration about their situation. The fact that there is a kitchen but it is not easy to access or to use causes negative feelings.

Data tabulated from Focus Group Hypothesis Coding				
	Cambridge	**East**	**Riverview**	**SWN**
Kitchen Mentioned as Positive Social Space	III	III		
Negative Aspects of Kitchen Mentioned			IIIII I	

(number of times expressed - Focus Group Hypothesis Coding)

Table 33. Focus Group Coding Tabulation Table: Expressions of Positive and Negative Aspects of Kitchens.

Moving on to an examination of social spaces shared by a residence hall floor. Good architects and spatial designers recognize that pathways and thoroughfares, when well crafted, can function as social spaces.[175] This study suggests that hallways can help to support the growth of the students' sense of floor-scale community within their residence hall and thus affect the social growth of the students ecological identity. Therefore this study asks: *Are there significant differences in the students' sense of community on the residential floors between students who live in residence halls that have hallways that function as social spaces and those who don't?*

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[175] Alexander, Ishikawa, and Silverstein, *A Pattern Language*, 501, 590, 634.

This examination will focus on a comparison between Riverview and Cambridge, which demonstrate a striking difference in design approaches to hallway space. Cambridge hallways in the residential areas are a relatively wide 6'8." Wide enough that students can stop and socialize without blocking the general flow of movement. These hallways are also lined with nooks at the entrances to pairs of suites that both add to the suites' privacy gradients and offer moments throughout the floor where a few people can step aside and informally chat.[176] Riverview hallways in the residential areas, which measure 4' 10," are not wide enough for students to feel comfortable stopping for random socializing. These hallways are straight and uniform for the length of the residential zone (Figure 20).

Riverview   Cambridge

Figure 20: Riverview and Cambridge Hallways.

In the focus groups, students from Riverview and Cambridge spoke differently about general movement on their residence hall floors. Riverview students talk about feeling like they live in a "shark tank" and stated that "no one really talks to each other on the floor." Students from Cambridge on the other hand describe how "people will see stuff going on while walking

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[176] Ibid., 495-498, 832.

by and join in." The residential zones in Cambridge are generally described as friendly and very social.

The focus group discussions are backed up by statistical analysis. In the one-way ANOVA, between-subjects design that examines the correlations between residence hall students groups and floor-scale community, Cambridge and Riverview measure on opposing sides of the spectrum (Tables 27, page 88; and Table 34). These analyses suggest that hallways are a built landscape feature that can work to either help or hinder the growth of a student's sense of community on their residence hall floor, and through this, can affect the social growth of their ecological identity.

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Floor Scale Community Measure			
	mean	Cambridge	Riverview
Measure of Floor Scale Community	2.75	1.05	3.94

(Survey question 12) (1= good, 5= poor)

Table 34. Data from ANOVA Analysis Table: Cambridge and Riverview and Floor-Scale Community.

This study posits that residence hall lounges are a space that can function to support the social life of residence hall residents. In order to assess the significance of the relationship between residence hall lounges and the growth of floor-scale community this study asks: *Are there significant differences between the social lounges on the residential floors of the residence halls that could affect the students' sense of community?* Analysis will again focus on the contrast between Riverview and Cambridge which rank the best and worst floor-scale community according to the survey analysis (Table 27, page 88) and best and worst according

to focus group tallies of positive and negative mentions of floor lounges (Table 35).

Data tabulated from Focus Group Hypothesis Coding				
	Cambridge	**East**	**Riverview**	**SWN**
Floor Lounges Mentioned as Positive Social Space	III	I		
Negative Aspects of Floor Lounges Mentioned		II	IIII	III

(number of times expressed - Focus Group Hypothesis Coding)

Table 35. Focus Group Coding Tabulation Table: Expressions of Positive and Negative Aspects of Floor Lounges.

In the focus group discussions, students from Cambridge speak positively about the social spaces on their residence hall floors. They talk about studying, cooking, watching tv, and in general being social in the floor common lounges. One student describes how easy it is to see what's going on in the different spaces and how he and his friends often study in the lounges at the ends of the halls. Another Cambridge student said "I've primarily used the community rooms as… sometimes I'll take friends who are often from other floors to the community room and use it as a study area or to cook." Another Cambridge resident described the social life of the community rooms: "A lot of people see and join in. So then you like rely on that person being there so you guys can hang every week or how ever that goes…"

In Riverview, the students in the focus group discussions describe the floor lounges as feeling "very isolated" and claim that the lounges are "not handy" to use. One Riverview students explained "people hang out in their rooms. Some people do hang out in the common area, but its usually just to watch like football games. Cause usually its just empty. So usually yeah, unless people are watching a football game and don't have cable in their room, they don't really sit out there either."

Riverview   Cambridge

semi-private   semi-public   public
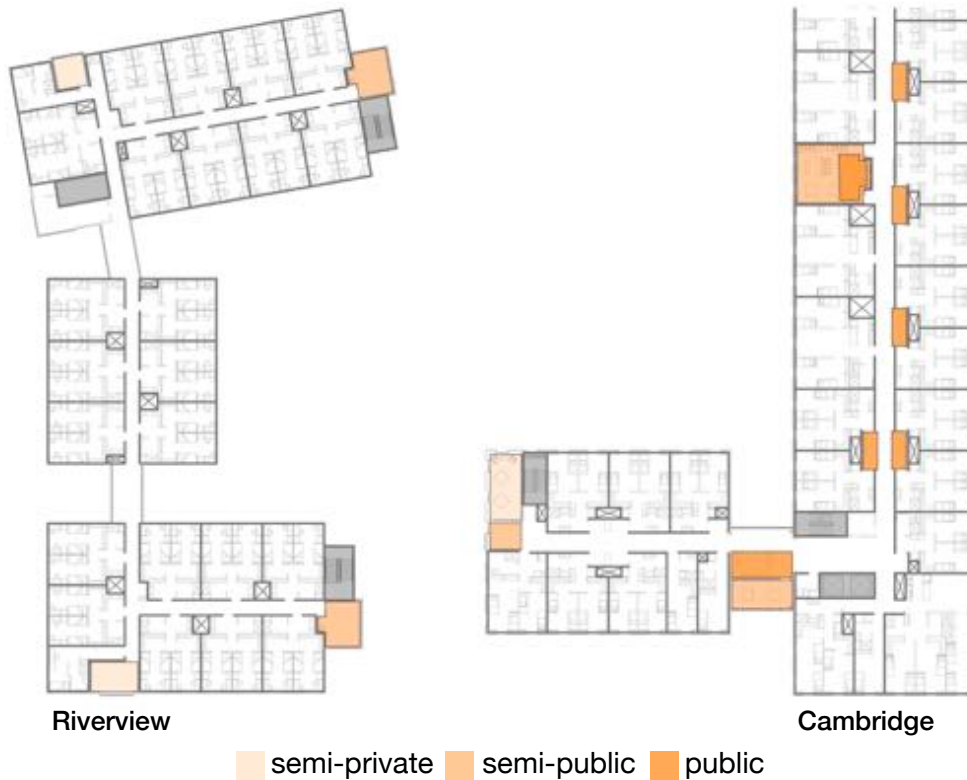
Figure 21: Riverview and Cambridge Floor Lounges

There are differences between the types of spaces that are offered to the students as lounges on the residential floors between these two residence halls that can account for some of the contrasting feedback about these spaces and help to explain how both the survey analysis and focus group coding produce such significantly contrasting measures (Figure 21).

In Riverview all of the floor lounges are approximately the same size, all are removed away from the main public hallway making them all semi-public or even semi-private spaces, and all offer students a similar atmosphere. All of the floor lounges in Riverview have one or two walls of tall windows, have two small tables and a few chairs against a wall, and two of the lounges have small tvs (Figure 22).

Figure 22: Riverview Floor Lounge

In Cambridge, there are a variety of sizes and types of lounge spaces available to the students. Some of the lounges overlap hallway space creating public and semi-public lounge spaces. Some of the lounges are more removed. The main lounge, located at the center of the floor, has a kitchen, a large tv, a couch, some tall chairs at the kitchen counter, and a few small tables (Figure 23). Other lounge spaces on each floor have study tables, and some have lounge seats.
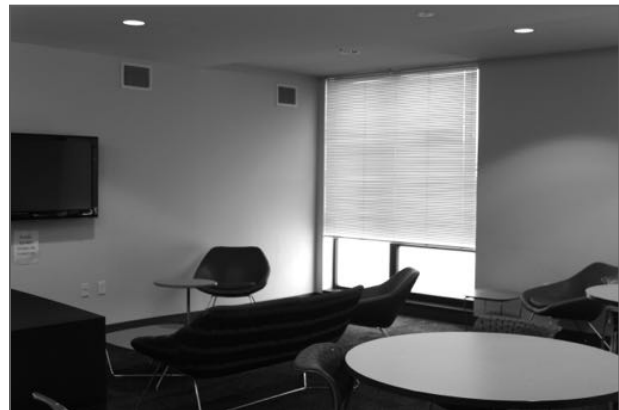
Figure 23: Cambridge Main Floor Lounge

The key difference between the lounge spaces offered for student use on the residential floors between Riverview and Cambridge is that Cambridge offers the residents variety; and

people are simply not happy if not given choices. Van Der Ryn and Silverstein, in their study of the Berkeley dorms in the 1960s talk about how rigidly defined spaces inhibit use and group social evolution, and suggest that students ought to be offered a variety of spaces.[177] Christopher Alexander describes people's need for a sequence of sitting spaces that vary in enclosure, privacy, size, and quality.[178] Current discussions about biophilic design talk about the basic human need for spatial variability which fosters emotional and intellectual stimulation.[179] By offering the students a variety of options for social spaces on the residential levels in Cambridge, this built landscape supports the growth of community. The lack of variety in Riverview seems to inhibit social growth — echoed by students in comments like "[the floor] doesn't feel like a community much because no-one really talks to each other" and "there's nowhere really to socialize."

A second quality that differs between the floor common lounges on the residential floors in Riverview and Cambridge is based on the concept of spatial adjacency. As Christopher Alexander states, "no social group… can survive without constant, informal contact among its members."[180] This means that common spaces which sit adjacent to common pathways help to encourage informal, random interactions and work to support the growth of the students' sense of community; and through this, can help to support the development of their ecological identity. One of the Cambridge residents described this type of random interaction when talking about their main floor lounge: "a lot of people are walking past, and they see so they want to [join]." Most of the common lounges in Cambridge lie adjacent to the floor's common path of travel. In Riverview, the lounges are either located at the far ends of the main pathway or at a distance from the main pathway. No one can see into the spaces before they reach

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[177] Van Der Ryn and Silverstein, *Dorms at Berkeley*, 26, 42.

[178] Alexander, Ishikawa, and Silverstein, *A Pattern Language*, 674.

[179] Stephen R. Kellert, "Dimentions, Elements, and Attributes of biophiloic Design," in *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, ed. by Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador (Hoboken NJ: John Wiley & Sons, Inc., 2008), 15.

[180] Alexander, Ishikawa, and Silverstein, *A Pattern Language*, 618.

them, and no one in the lounges can see who is approaching. This means that these spaces in Riverview do not function informally and social spontaneity is lost (Figure 24).
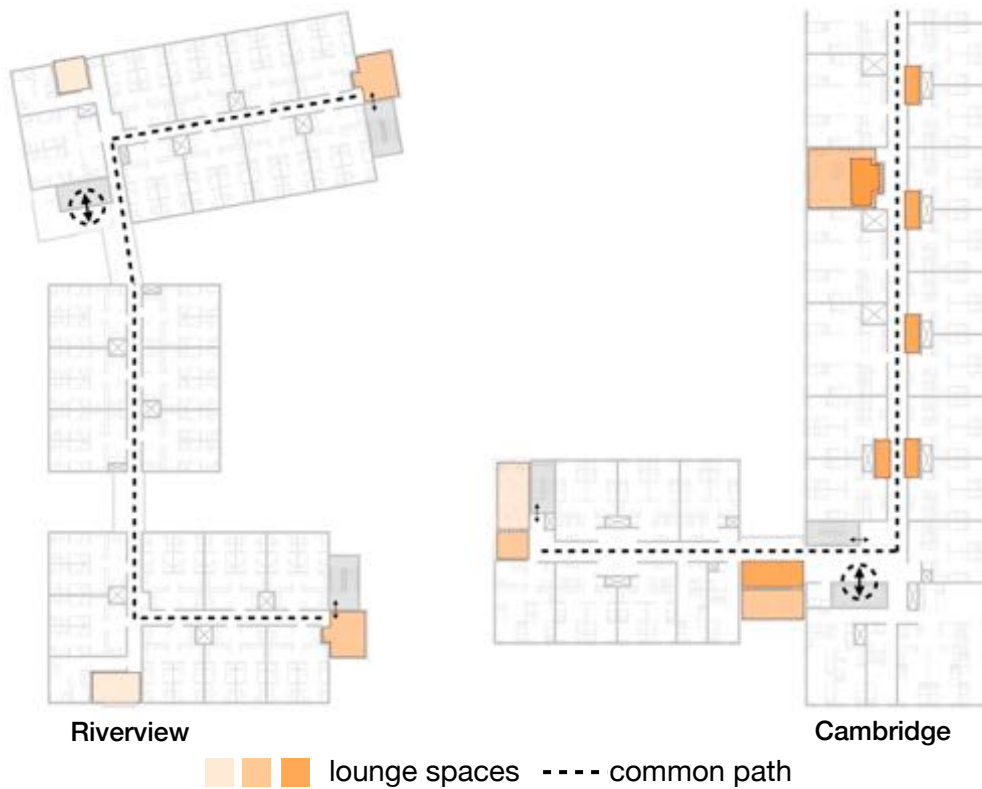
Figure 24: Riverview and Cambridge Social Adjacencies

These floor-scale differences between the built landscapes of the residential levels — privacy gradients, suite commons, kitchens, hallways, floor lounges, and spatial adjacencies — likely play a role in the extremely different measures of community on the residential floors between the four residence halls (Table 34, page 99), and through this may play a role in the students' ecological behavioral-learning much of which happens through the social diffusion of attitudes and normative influences on behavior.

4.3.2. Findings: Community — Residence Hall Building

This study postulates that the growth of the students' sense of community within a residence hall building is affected by the quality and locations of the residence hall buildings' common spaces. Therefore this study asks: ***Are there differences between the social spaces shared by the residents of each whole residence hall that affect the growth of the students' sense of community?***

An analysis using a one-way ANOVA, between-subjects design to compare correlations between each residence hall student group and their sense of community within their whole residence hall shows very different mean values for each students group (Table 36). Focus group coding supports the survey results and also reflects a great deal of variation between the groups in their positive and negative descriptions of community within their residence hall buildings (Table 37). These differences can potentially be attributed to distinct aspects of the residence halls' built environments. The following subsection explores differences in the built landscapes of the residence halls that can potentially affect the students' ability to build and maintain a sense of community as a whole residence hall, and through this, affect the residents' social opportunities for ecological behavioral-learning.

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Building Scale Community Measure					
	mean	**Cambridge**	**East**	**Riverview**	**SWN**
Measure of Building Scale Community	2.88	1.40	3.00	4.29	3.11

(Survey question 13) (1= good, 5= poor)   F = 86.61, p < 0.0001

Table 36: Data from ANOVA Analysis Table: Residence Hall Groups and Building-Scale Community Measure

Data tabulated from Focus Group Provisional and Hypothesis Coding				
	Cambridge	**East**	**Riverview**	**SWN**
Good Building Community	IIIII III	IIII		III
Bad Building Community			IIIII IIIII	

(number of times expressed - Focus Group Hypothesis Coding)

Table 37: Focus Group Coding Tabulation Table: Expressions of Building Community

Spatial analysis at the building scale will focus on comparisons of Riverview and Cambridge. All of the Sandburg Towers are connected by a central commons building that houses all of the building-scale social spaces. An examination using a one-way ANOVA, between-subjects design to compare correlations between each residence hall student group and their sense of community as a member of their residence hall shows very different mean values for Riverview and Cambridge. However a Tukey-Kramer HSD test produces a Connecting Letters Report that indicates, while the different building-scale community mean values between Riverview and Cambridge are statistically significant, the differences between Sandburg East and SWN are not (Table 38). This suggests that the differences in community measure at the residence hall building scale that does exist between East and SWN is due to community factors that exist at the floor and neighborhood scales. Therefore the contrasts between East and SWN at the scale of the residence hall buildings will not play a role in this

subsections' analyses.

ANOVA Connecting Letters Report for Study Investigating the Relationship between: Building Community Mean by Residence Hall Group			
Cambridge	East	Riverview	SWN
		A	
	B		B
C			

Levels not connected by the same letter are significantly different

Table 38: ANOVA Connecting Letters Report: Building Community by Residence Hall Group

The last three issues discussed that affected the students' sense of community within their residential floors — hallways that can function as social spaces; social lounges that offer a variety of spatial choices; and social adjacencies — apply to building-scale spatial experience as well. Looking at floor plans that show the buildings' common spaces: lounges, cafeterias, dining areas, computer labs, etc., issues similar to the floor-scale problems discussed earlier exist in Riverview and do not exist in Cambridge (Figure 25).

In Cambridge the building's common spaces are located adjacent to major circulation, they vary in size and orientation, and many of these spaces meld into the space of the main hallway creating overlapping zones that make portions of the main hallway itself function as a social commons, all of which help to support the social lives of the Cambridge students. In Riverview, the common spaces do not vary greatly in size and they are located off of secondary pathways. One Riverview student described "We don't talk. Nobody talks to each other. Nobody really socializes between, like all of the floors, and no-one really socializes outside of that and there's nowhere really to socialize either."

Riverview - Ground

Computer Area
Common Lounge
Restor Shop

Riverview - Lower

Kitchen

Dining Commons
Cafeteria

Cambridge

Cafeteria
Dining Commons
Computer Lab
Common Lounge

Waiting Area
Restor Shop

common spaces · · · · circulation ← main entry

outside security ^   ^ within security
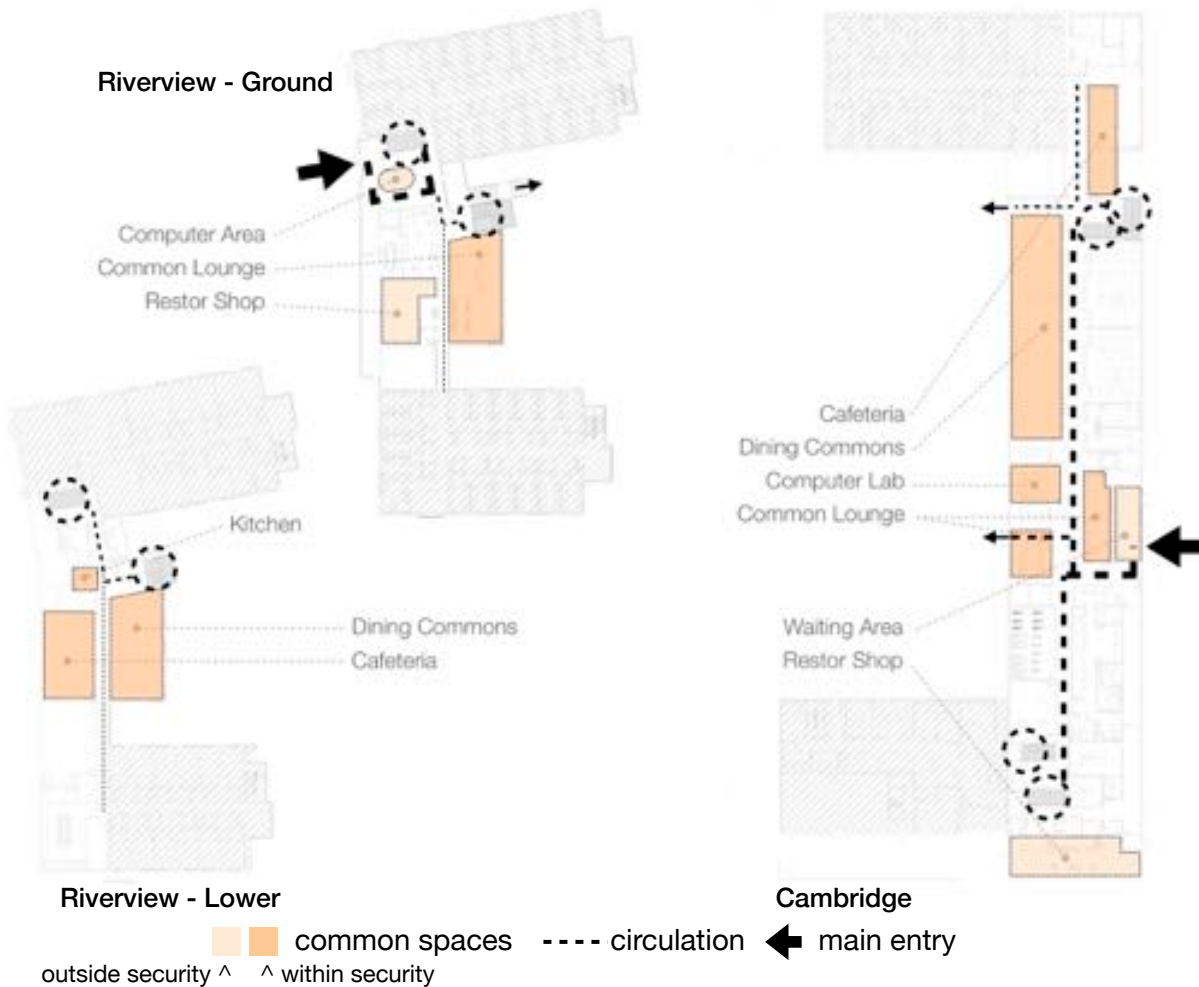
Figure 25: Riverview and Cambridge Building Commons and Social Adjacencies.

There are also a few new design issues at the building-scale that emerge from a further analysis of these spatial layouts. Contrasts in design approaches between Riverview and Cambridge can be exemplified by examining two specific commons spaces: the cafeteria and the general-use computer space.

An analysis using a one-way ANOVA, between-subjects design reveals a statistically significant correlation between the students' sense of community within their residence hall building and cafeteria usage (Table 39). According to a Tukey-Kramer HSD test Connecting Letters Report, a low sense of community within a residence hall can be linked to not frequently eating in the residence hall's cafeteria (Table 40).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Building Scale Community Measure and Measure of Cafeteria Usage				
	mean	High Building Community	Mid Building Community	Low Building Community
Measure of Cafeteria Usage	2.11	1.97	1.98	2.66

(Survey question 37) (1= often, 5= never)   **F = 15.06, p < 0.0001**

Table 39: Data from ANOVA Analysis Table: Building-Scale Community and Cafeteria Usage.

ANOVA Connecting Letters Report for Study Investigating the Relationship between: Building Scale Community Measure and Measure of Cafeteria Usage		
High Building Community	**Mid Building Community**	**Low Building Community**
		A
B	B	

Levels not connected by the same letter are significantly different

Table 40: ANOVA Connecting Letters Report: Building Community by Cafeteria Usage.

In Cambridge, the cafeteria is described as a social place where its "easy to just talk to people and meet new people." One student in the focus group discussion said: "when I have met new people, or talk to people that I haven't talked to too much, it has been primarily in the cafeteria." Cambridge's cafeteria is located adjacent to the main building entrance, the primary building pathway, and is near the other major building lounges (Figure 25).

In Riverview, the common spaces are split between two floors and the cafeteria is located a level below the main entrance and is adjacent only to a secondary pathway (Figure 25). The cafeteria space is described as "unfriendly" and one student explained "you know, if you're getting a plate of food, you either take it up to your room and eat there, or you sit with a friend that came with you, or you sit alone, eat and then go back up. There's really no social aspect to it." One focus group student stated that "people really only socialize down there if they're going down there with friends in the first place." The cafeteria's sequestered location does not offer

students opportunities for random encounters or support informal social interactions, and therefore do not function to support the growth of the students' sense of community.

The spatial conditions of the computer labs also differ between Riverview and Cambridge. In Riverview the computer area has only three machines and is located just outside of the security check point for the building (Figure 25). This means that students have to walk past the main desk to get to the computers and then have to swipe back into the building when they are done. The students in the focus group complained about this situation a number of times: "the computers, they literally make you swipe in for computers that are right across the front desk. They make me swipe in every time. They're like 'you need to swipe in.' I'm like 'I've literally been in your eyesight the last twenty minutes while I've printed this paper.' Yep." The computer lab in Riverview is a undesigned spatial afterthought and plays no role in the social life of the residence hall residents.

In Cambridge, the computer lounge is located adjacent to the dining area and the main entrance to the building. There are approximately a dozen computers and students describe the space as very social and as a place where social bonding happens, especially late at night.

> Another community space, the computer area over there. A lot of people go over there even though most people have laptops. But they still go over there. People are there until like 3 o'clock in the morning, complaining about the homework they have to do or stuff like that. — Yeah, you're in it together at that point, because you're probably both doing the same thing. — Yeah, and it's where like I felt like most of the socializing comes from. You know we talk about politics around that area, we talk about just like everything in that area.

Cambridge's common areas function as central places where students can sit and eat, socialize, and do schoolwork while watching people go by. These types of spaces encourage informal interactions that can function as the social glue that helps the growth of the residents' sense of community.[181]

A final space that this study will examine which has the potential to affect the growth of the students' community in their residence hall building, and potentially affect the growth of their

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[181] Ibid., 439.

ecological identity, is the outdoor terrace. This space also has the potential to play an

expanded role in the students' relationship with the residence halls' larger environmental

setting. Both Riverview and Cambridge have large terraces but due to differences in design

and placement they both function very differently in the daily lives of the residence hall

students.

In Riverview, the terrace is located off of a lower level adjacent to the cafeteria and dining

commons. The terrace itself is concrete and sits approximately a story above the slope that

leads down to the Milwaukee River. The Cambridge terrace is a grass lawn that is adjacent to

the building commons on the main floor and sits as the top of the slope that leads down to the

Milwaukee River (Figure 26).
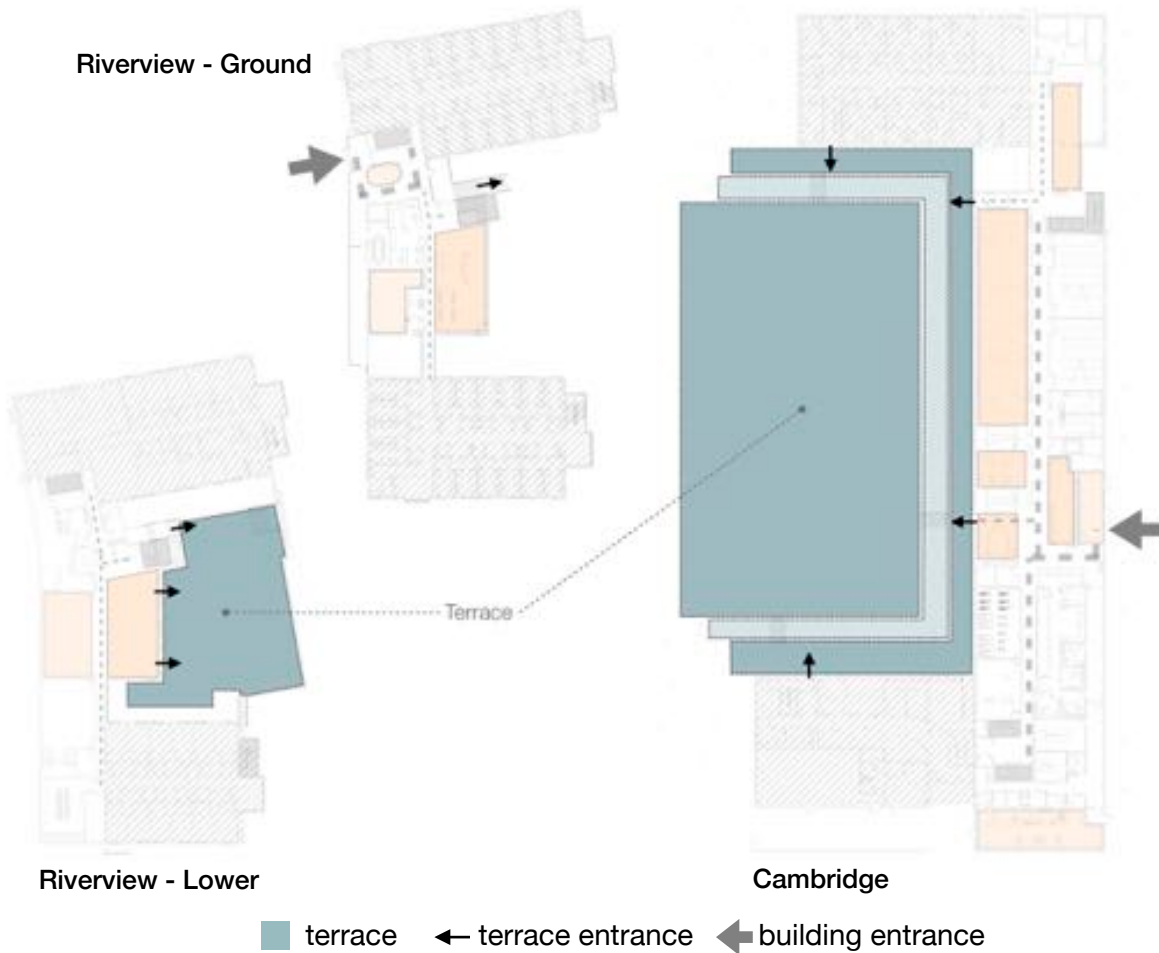
Figure 26: Riverview and Cambridge Terraces.

The Riverview terrace is described by students in the focus group as not well used.

Students described:

Most people don't actually use it. Some people used it to smoke hooka. — I feel like just, I'm here inside, and the terrace is just like, I don't know, you can't really do anything on it. — Yeah, its just kind of like sitting, and like if you want to get like a tan or something you can do that, but that's about it. You can't do anything else, there's nothing there. — The only time I see people out there, there're like either two people eating lunch or a person smoking. Its where people go to smoke.

The issue with the Riverview terrace is that it does not relate to the interior of the building in

a social way nor does it function to connect the building to the surrounding environment. It is

adjacent to an interior space located on a lower floor that is perceived as unfriendly (the cafeteria) and sits far enough above the landscape that it doesn't offer any sense of connection to the surrounding setting.

The Cambridge terrace on the other hand is described by students as "very public and approachable." It is well used. It connects directly to Cambridge's cafeteria and is often occupied by students eating, studying, and playing.

> Another important community area I would say… yeah, the courtyard. I feel like that's a good community area. We've played flag football out there, I've even ate lunch with a few friends out there from my floor, did homework out there… Its a very approachable space I think. Like you know when you see people playing a game out there in the courtyard then, you know, it doesn't feel in any way wrong to go ask to join them. Its a very public and approachable space. The entire building looks out on the court area, looks out on the fields, you perceive people doing things down there, it wouldn't be too weird to like just go down and say 'hi.' Also, like the cafeteria is right next to it so you can just go out…

Cambridge's terrace fulfills a number of Christopher Alexander's spatial recommendations for socially successful spaces. This terrace functions as an outdoor room where students feel comfortable hanging out.[182] It has views that connect it directly to a larger open natural space and it has multiple entries, a few of which happen across from each other.[183]

The differences between these two terraces could be one of the factors in the built landscapes of these two residence halls that affects the residents' extremely different building-scale community measures (Table 41).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Building Scale Community Measure			
	mean	Cambridge	Riverview
Measure of Building Scale Community	2.75	1.05	3.94

(Survey question 13) (1= good, 5= poor)

Table 41: Data from ANOVA Analysis Table: Cambridge / Riverview and Building-Scale Community Measure.

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[182] Ibid., 349.

[183] Ibid., 564.

The terraces also have the potential to function at a larger scale and help to relate the students' sense of community to the buildings' riparian settings within the city. Connections with nature of this sort have been shown to improve a person's nature valuation and aid in defining a strong ecological identity.[184]

As described above, Riverview's terrace is essentially a concrete platform that sits above the surrounding landscape. Though the view of the river is beautiful from the terrace, there is no sense that one could easily walk out and into the river zone. In Cambridge, the green terrace is a lawn that seems to be a part of the river's landscape. Even though the Cambridge terrace is enclosed because of residence hall security requirements, it's immediate adjacency to the river and the river trails offers the students a sense of connection that extends past the actual edges of the terrace. One student in the Cambridge focus group expressed frustration that he has to walk out of the main building entrance and all the way around the building every time he wants to go down to the river, suggesting that this is a common activity. There is a direct path down to the river from the southwest corner of Cambridge.

The residents of Riverview do not feel this connection and describe the river and trails as dirty, dark, and dangerous: "I was just going to say that I don't really plan on going on trails cause I'm afraid I'll get mugged or some shit. Sorry for the language…" If Riverview students do want to access the river zone, they have to take a path that cuts north a ways, then cuts south a ways and passes under the bridge to meet the river trail. Not only is their perceived connection to the river and the trails less than Cambridge, their actual connection is less (Figure 27).

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184 Kellert, "Dimentions, Elements, and Attributes of Biophiloic Design," 4, 10-11.

Figure 27: Riverview and Cambridge Terrace Connections.

Cambridge's terrace fulfills requirements for a number of different sustainability dialogues. It meets LEED's *Open Space* credit, which lists minimum requirements for open and green spaces in a design project, meant to encourage interaction with the environment through recreation and outdoor activity.[185] Cambridge's terrace also addresses some of Stephen Kellert's biophilic design attributes: *Transitional Spaces* that link built and natural environments and *Inside-Outside Spaces* that connect interior and exterior environments, both which offer increased healing, social health, lower stress, and improved performance. Kellert links contact

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[185] U.S. Green Building Council, *LEED v4 for building Design and Construction, updated July 8, 2017,* (https://www.usgbc.org/resources/leed-v4-building-design-and-construction-current-version), 36.

with nature with positive valuations of nature and stronger social ties with those that share these environmental connections. Perceived connections with nature of this sort can play a significant role in the development of a strong ecological identity.[186]

One unexpected outcome of the data analysis, especially after experiencing the focus group discussions, is that even though Riverview students repeatedly express negative impressions of their surrounding natural environment, one-way ANOVA, between-subjects designs reveals statistically significant correlations which show that Riverview students still rate better than any of the Sandburg students both in frequency of nature visits (Table 42) and in general NEP rating (Table 3, page 65).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Frequency of Nature Visits							
	mean	Cambridge	East	Riverview	SWN	F Ratio	Prob > F
Frequency of Nature Visits	3.14	2.30	3.54	3.06	3.86	23.69	< 0.0001

(Survey question 71) (1= good, 5= poor)

Table 42: Data from ANOVA Analysis Table: Residence Hall Groups and Frequency of Nature Visits.

This demonstrates that even though Riverview students feel disconnected from the river and its natural environment, Riverview's proximity to the river and trails functions to connect Riverview students to their surrounding natural setting to a measurable extent.

The correlation between NEP rating and the four residence hall student groups produces an F-ratio of 37.29 (Table 3, page 65). A one-way ANOVA, between-subjects design analysis that looks at on-campus versus off-campus student groups shows an F-ratio of 54.02 (Table 43). This increase suggests that Riverview's and Cambridge's location, right on the Milwaukee River, helps students connect to a larger environmental setting.

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[186] Kellert, "Dimentions, Elements, and Attributes of Biophiloic Design," 4, 10-11.

Data from ANOVA Summary Table for Study Investigating the Relationship between: On vs. Off Campus Groups and NEP rating					
	mean	**Off-Campus**	**On-Campus**	**F Ratio**	**Prob > F**
NEP	2.32	1.99	2.69	*54.02*	*< 0.0001*

(1= good, 5= poor)

Table 43: Data from ANOVA Analysis Table: On and Off Campus Groups and NEP rating.

As Hartag, Bringslimark, and Patil discuss in their chapter "*Restorative Environmental Design: What, When, Where, and for Whom?*" any connection to nature, whether it is a physical connection, a view of nature, a visual representation of nature, or even a symbol of nature, appeals to an innate affinity with nature.[187]

This affinity, that the Riverview and Cambridge students seem to feel more strongly than their Sandburg counterparts, is reflected in in the Awareness of Consequences and Ascription of Responsibility measures from the Ecological Behavioral Theory Framework (Figure 13, page 42). One-way ANOVA, between-subjects designs reveal statistically significant correlations between on-campus versus off-campus student groups and both their Awareness of Consequences measure (Table 44) and their Ascription of Responsibility measure (Table 45). This indicates that the students' proximity to the natural zone of the river increases their ecological awareness and sense of ecological responsibility both of which function as a foundation for the development of ecological identity.

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[187] Terry Hartag, Tina Bringslimark, and Grete Grindal Patil, "Restorative Environmental Design: What, When, Where, and for Whom?" in *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, ed. by Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador (Hoboken NJ: John Wiley & Sons, Inc., 2008), 133.

Data from ANOVA Summary Table for Study Investigating the Relationship between: On vs. Off Campus Groups and Awareness of Consequences measure					
	mean	Off-Campus	On-Campus	F Ratio	Prob > F
AC measure	2.11	1.78	2.48	56.86	< 0.0001

(1= good, 5= poor)

Table 44: Data from ANOVA Analysis Table: On and Off Campus Groups and Awareness of Consequences Measure.

Data from ANOVA Summary Table for Study Investigating the Relationship between: On vs. Off Campus Groups and Ascription of Responsibility measure					
	mean	Off-Campus	On-Campus	F Ratio	Prob > F
AR measure	2.68	2.28	3.14	71.15	< 0.0001

(1= good, 5= poor)

Table 45: Data from ANOVA Analysis Table: On and Off Campus Groups and Ascription of Responsibility Measure.

4.3.3. Findings: Community — Residence Hall Neighborhood

In order for this study to address correlations between the students' sense of community in their local neighborhood and their daily built landscapes, this subsection is lead by the question: *Are there significant differences between the residence halls that relate to the buildings' locations within their local neighborhoods that affect the growth of the students' sense of community?* An analysis using one-way ANOVA, between-subjects design comparing each residence hall student group and their neighborhood community measure shows statistically significant differences in mean values (Table 46). This indicates that different aspects of the four residence halls' placement in relation to their local neighborhoods does

affect the students' sense of belonging to their neighborhood community and, through this, affect the students' social opportunities for ecological behavioral-learning.

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Neighborhood Community							
	mean	Cambridge	East	Riverview	SWN	F Ratio	Prob > F
Neighborhood Community	3.14	1.40	3.08	3.97	4.39	74.28	< 0.0001

(Survey question 70) (1= good, 5= poor)

Table 46: Data from ANOVA Analysis Table: Residence Hall Groups and Neighborhood-Scale Community Measure.

Of the different scales of community that this study addresses (floor, building, and neighborhood), NEP rating corresponds most strongly with the students' sense of neighborhood community (Table 47). This suggests that some of the built landscape factors that relate to the students' relationship with their local neighborhood have an effect on their ecological identity.[188]

F-Ratio Table for the Relationship between: NEP by:	
Community	35.19
Floor Scale Community	23.53
Building Scale Community	20.53
Neighborhood Scale Community	46.24

Table 47: F-Ratio Relationships Table: NEP and Community Scales.

This study proposes that the growth of students' sense of neighborhood community is linked to the growth of their ecological identity and is affected by their residence hall's location

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[188] Dunlap et al., "Measuring Endorsement of the New Ecological Paradigm," 427.

within the city. Each residence hall's specific placement has an affect on the students' perceptions of their local communities that either helps or hinders the growth of the students' sense of belonging to a neighborhood community.

As described previously, there is a statistically significant correlation between each residence hall student group and their sense of neighborhood community (Table 46). In order to address the residence hall student groups' specific location within the city, a slightly different baseline analysis is needed because the Sandburg Towers, East and SWN, share an urban location. The adjusted question is: *Is there a significant difference in the students' neighborhood community measure between Cambridge, Riverview, and the Sandburg Towers?* A one-way ANOVA, between-subjects design shows that there is a statistically significant difference between the neighborhood community measure and these three distinct locations (Table 48).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Location and Neighborhood Community						
	mean	Cambridge	Riverview	Sandburg	F Ratio	Prob > F
Neighborhood Community	3.14	1.40	3.97	3.83	*79.60*	*< 0.0001*

(Survey question 70) (1= good, 5= poor)

Table 48: Data from ANOVA Analysis Table: Location and Neighborhood-Scale Community Measure.

In fact, the F-ratio is greater in this analysis than when all four residence hall student groups are addressed separately (Table 46). This suggests that the residences halls' locations do play a significant role in the formation and growth of the students' sense of community at the neighborhood-scale.

This allows this study to ask: *Are there aspects of each residence hall's specific location that affect the students' sense of neighborhood community?* Focus group coding analysis

reveals an interesting pattern. A tabulation of positive and negative mentions of neighborhood community show Cambridge and Riverview on either side of the spectrum which backs up the survey data results (Table 48 and 49). However, the Sandburg residents, both East and SWN, don't speak negatively about their local neighborhood, they even make a number of positive mentions, yet the results from the survey analysis suggest that they do not feel a significant connection or sense of belonging with their local neighborhood.

Data tabulated from Focus Group Provisional and Hypothesis Coding				
	Cambridge	East	Riverview	SWN
Positive Neighborhood Community	IIIII III	IIII		III
Negative Neighborhood Community			IIIII IIIII	

(number of times expressed - Focus Group Hypothesis Coding)

Table 49: Focus Group Coding Tabulation Table: Expressions of Neighborhood Community.

Sandburg East and SWN share a connecting commons building that offers the approximately 2,400 Sandburg residents not only a cafeteria and a few common study lounges, but also a coffee shop, a restaurant that's open late, an events venue, and a movie theater (Figure 28).

Computer Lab
Channel Lounge
Dining Commons
Cafeteria

Sandburg Commons - Level 2

Restor Shop
Palms Restaurant
Coffee Shop
Flick's Theater

Sandburg Commons - Level 1
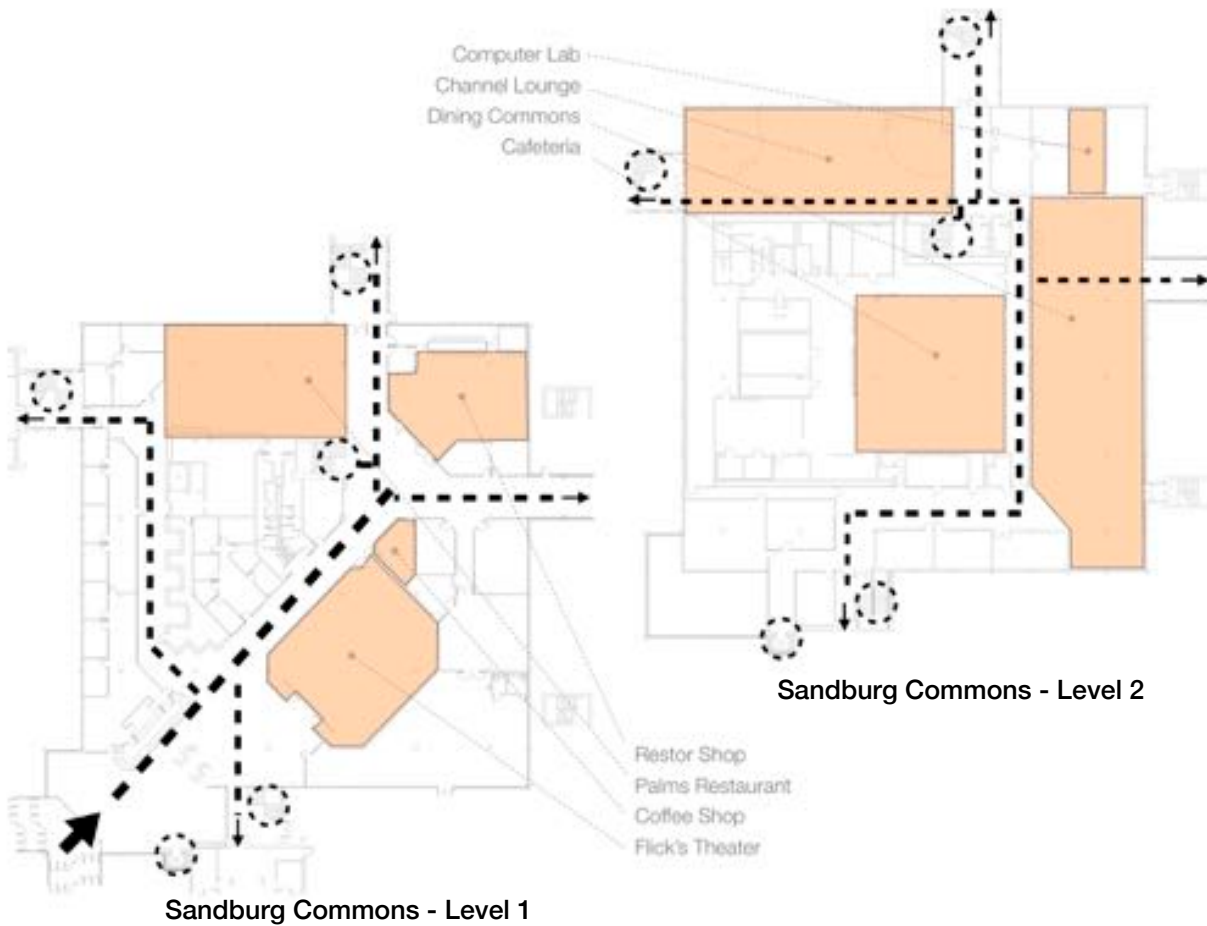
Figure 28: Sandburg Commons.

This built landscape along with the data analysis suggests that the Sandburg students, even though they have positive impressions of their local neighborhood, do not feel the need to connect with the local neighborhood community because their commons building offers all of the amenities and resources that are usually found within a neighborhood. Sandburg students even refer to their life on campus as "living in a bubble."

> I don't really, like, I feel like we don't really associate with the neighborhood, only the campus. — I think we're kind of in a bubble here, cause campus is all just like right here. (*others agree*) Like I don't really, when people say like, when you say you go to Milwaukee they think you're in like a dangerous area and stuff, but like, I really feel like we're kind of just like over here, and like everything else is over there…

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According the focus group discussions, when they do venture off of campus, Sandburg students usually stick to the zone of Oakland avenue immediately adjacent to campus, and when the Sandburg residents do go further afield they tend to use the campus shuttles and stay near the other residence halls. (There are a few exceptions to this that will be addressed shortly).

Cambridge and Riverview, which are both located off of campus and proximate to the dense and lively community of North avenue, have differing impressions of their surrounding neighborhood community as demonstrated in both the survey and the focus group analysis results (Table 48, page 120; and Table 49, page 121).

Cambridge residents describe their local neighborhood as friendly and speak positively of their location in the city. In both the focus group and the survey, the Cambridge residence hall group mentions a wide variety of places and place-types in their local neighborhood that they frequent in their daily and weekly lives (Figure 29). The vast majority of the places that the Cambridge students referred to are with a 20 minute walk of Cambridge and almost half of these exist within a 10 minute walk.[189] Students in Cambridge feel safe and connected to their local neighborhood. This kind of an urban setting is encouraged in the LEED credit: *Surrounding Density and Diverse Uses* which encourages building in settings of existing density and infrastructure in order to encourage walkability and health.[190]

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[189] Jeff Speck, *Walkable City: How Downtown Can Save America, One Step at a Time (*New York: North Point Press, 2012), 11; Walk Score, "Walk Score Methodology," (https://www.walkscore.com/methodology.shtml) — offers a rating system that prioritizes locations within a five minute walk and uses a decay function up to a thirty minute walk; anywhere beyond a thirty minute walk is not included.

[190] See: U.S. Green Building Council. *LEED v4 for building Design and Construction, updated July 8, 2017*. https://www.usgbc.org/resources/leed-v4-building-design-and-construction-current-version.
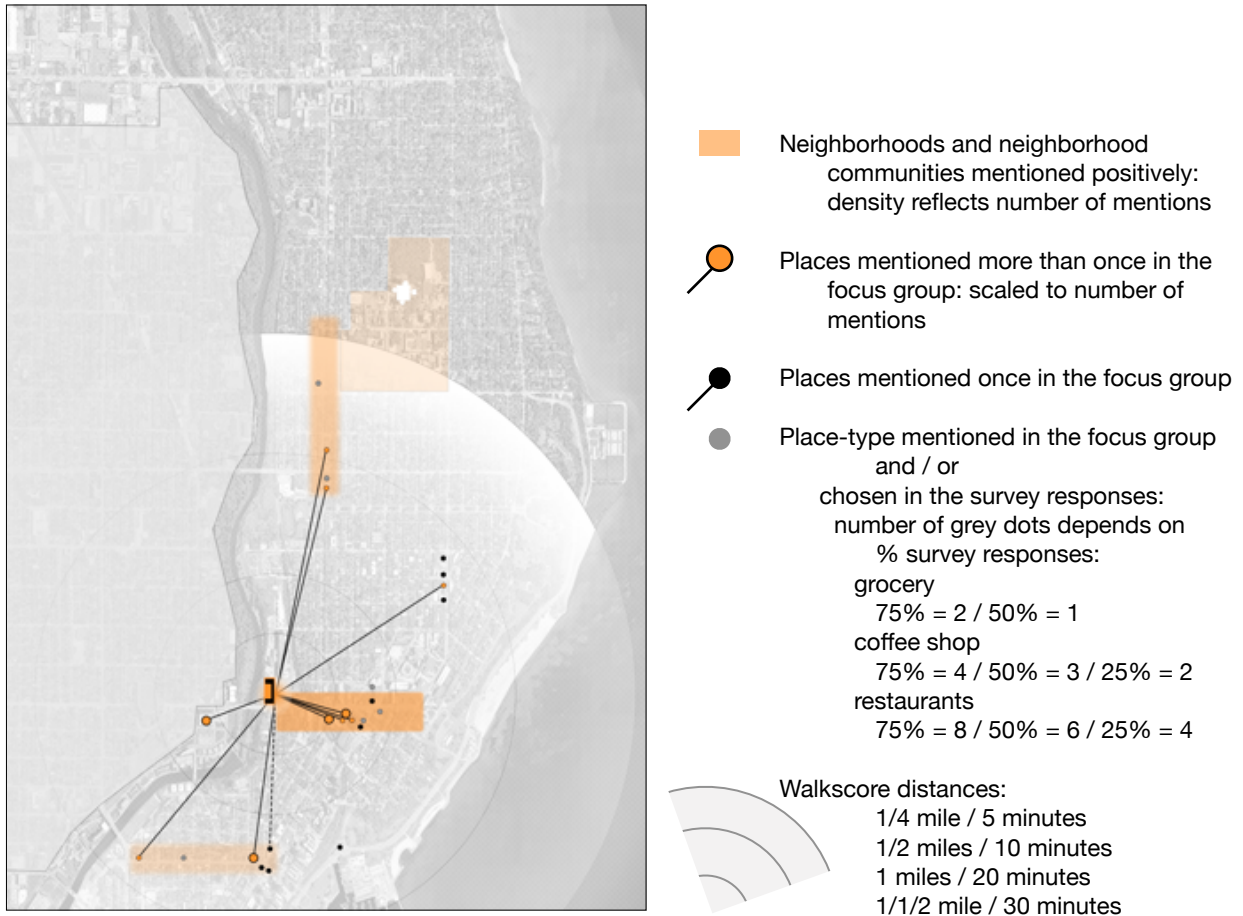
Figure 29: Cambridge Place and Neighborhood Connections.

Even though Riverview is located only across the river from Cambridge, this difference has a number of consequences that affect the Riverview residents' ability to feel connected with their local neighborhood. The neighborhood on the west side of the river, Riverwest, which is immediately adjacent to Riverview, is described by the residents as "sketchy," "not friendly," and "dangerous." To the east is the river, perceived as an unfriendly zone, and a bridge. In the focus group discussions, the bridge was referred to as a boundary, and when a student would cross it they would find themselves on "Cambridge's side."

If you go across the bridge there's Cambridge, and that already feels like a completely different area because there's such a divide between the two residence halls. — Its been a common thing, like you either live in Riverview or you live in Cambridge and there's kind of like a rivalry between the two. Its very odd, I never understood it or understood why, but, for some reason there's just like, you're on one side of the river or the other side, and so that's kind of how it works out.
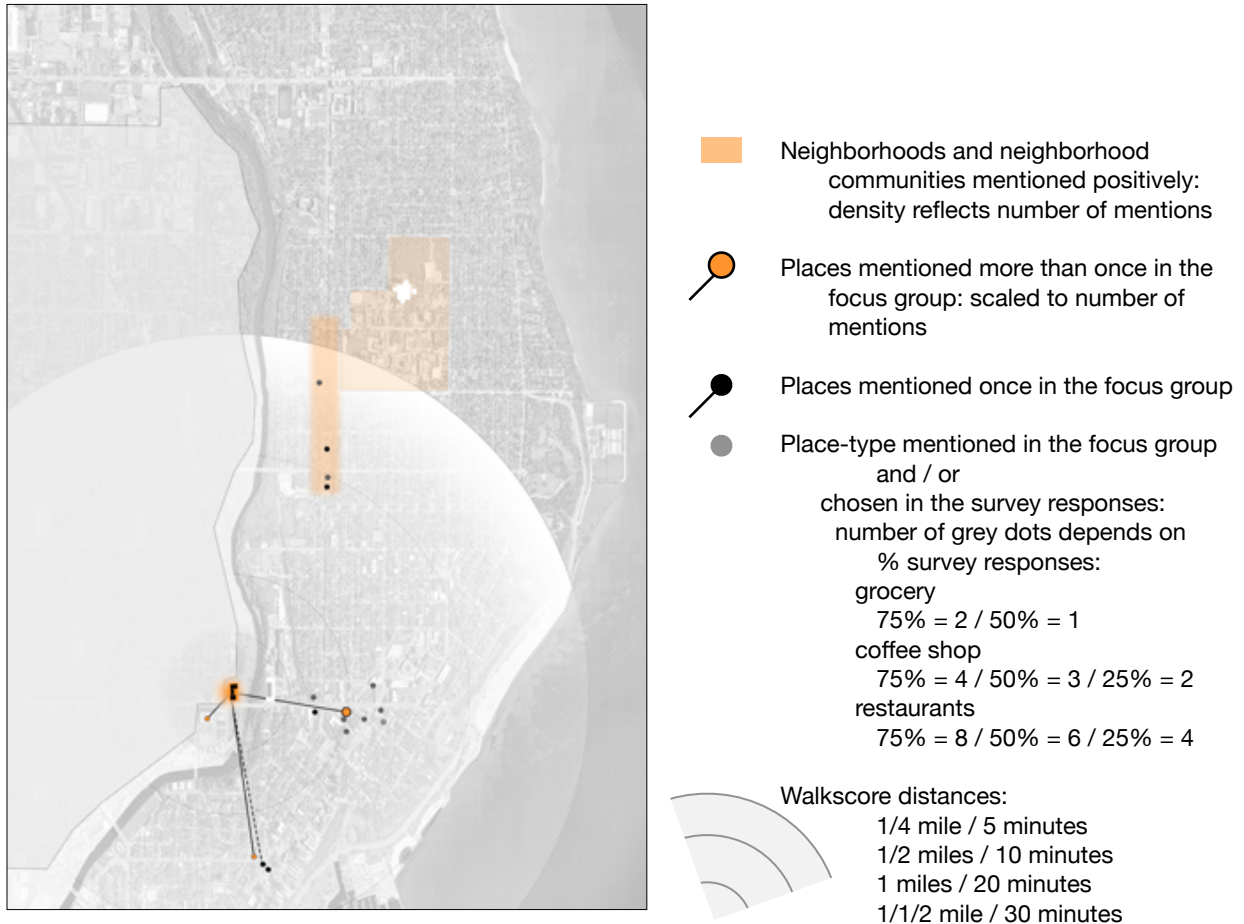
Figure 30: Riverview Place and Neighborhood Connections.

Riverview residents describe their setting as "cut off" and "isolated." Even though the difference may not seem great, the fact that Riverview students are on the east side of the river increases the distance they have to walk to access the places along North avenue and other near by locations. There are far fewer places and place-types mentioned in the focus groups

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and the survey by Riverview students compared to Cambridge students — and most of these are outside of a 10 minute walk (Figure 30). All of these factors play a role in the Riverview students expressing a low sense of neighborhood community connections, which in turn lessens their opportunities for ecological behavioral-learning within their local neighborhood.

A final finding that stems from an examination of both the focus group and the survey data mapping, extends the scale at which kitchens can affect the students' sense of community and their community connections. This study noticed an obvious difference in place and place-type mapping between Cambridge and Riverview and between East and SWN. What stood out was that a number of the furthest point connections that emerged in mapping Cambridge and East places are for grocery stores. This leads the study to ask: *Is there a correlation between kitchen use and the students' sense of belonging in their neighborhood community?*

This study ran a correlational analysis between neighborhood-community measure and kitchen-use measure using a one-way ANOVA, between-subjects design. This analysis produces a strong statistically significant correlation with an F-ratio of 116.06 (Table 50).

ANOVA Summary Table for Study Investigating the Relationship between: Neighborhood Community by Kitchen Use					
Source	df	Sum of Squares	Mean Square	F Ratio	Prob > F
Kitchen Use	1	147.30	147.30	*116.06*	*< 0.0001*
Error	131	166.26	1.27		
C. Total	132	313.56			
N = 133					

Table 50: ANOVA Summary Table: Neighborhood Community by Kitchen Use.

This suggests that the activity of cooking indirectly helps to connect residence hall students to their local neighborhood community. This effect can help explain why, even though Sandburg

East and SWN share a location, their neighborhood-scale community measures differ (Table 46, page 119).

In the focus group discussions, students from Cambridge and East mention grocery shopping. Again, East students are offered a kitchen in every suite; in Cambridge, a few suites have kitchens, and those that do not, have access to a common kitchen at the center of every floor. Every Cambridge suite, kitchen or no, has a large refrigerator for the storage of groceries (Figure 31).
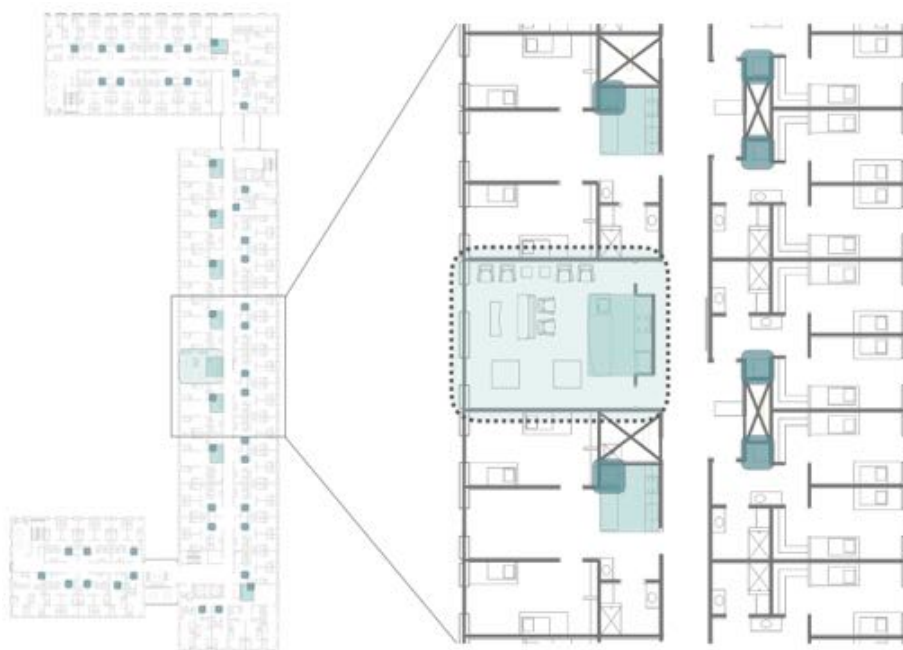
Figure 31. Cambridge Refrigerators.

Riverview students, who live directly across the street from a Pick N Save, only mention the store as a source of medicine and snacks, not as a source of groceries or meals. A student from SWN said "I don't see the point in going to the grocery store. I might get snacks every now and then."

A mapping diagram of places, place-types, and neighborhoods with grocery stores highlighted helps to explain some of the subtle differences between the residence hall groups (Figure 32).
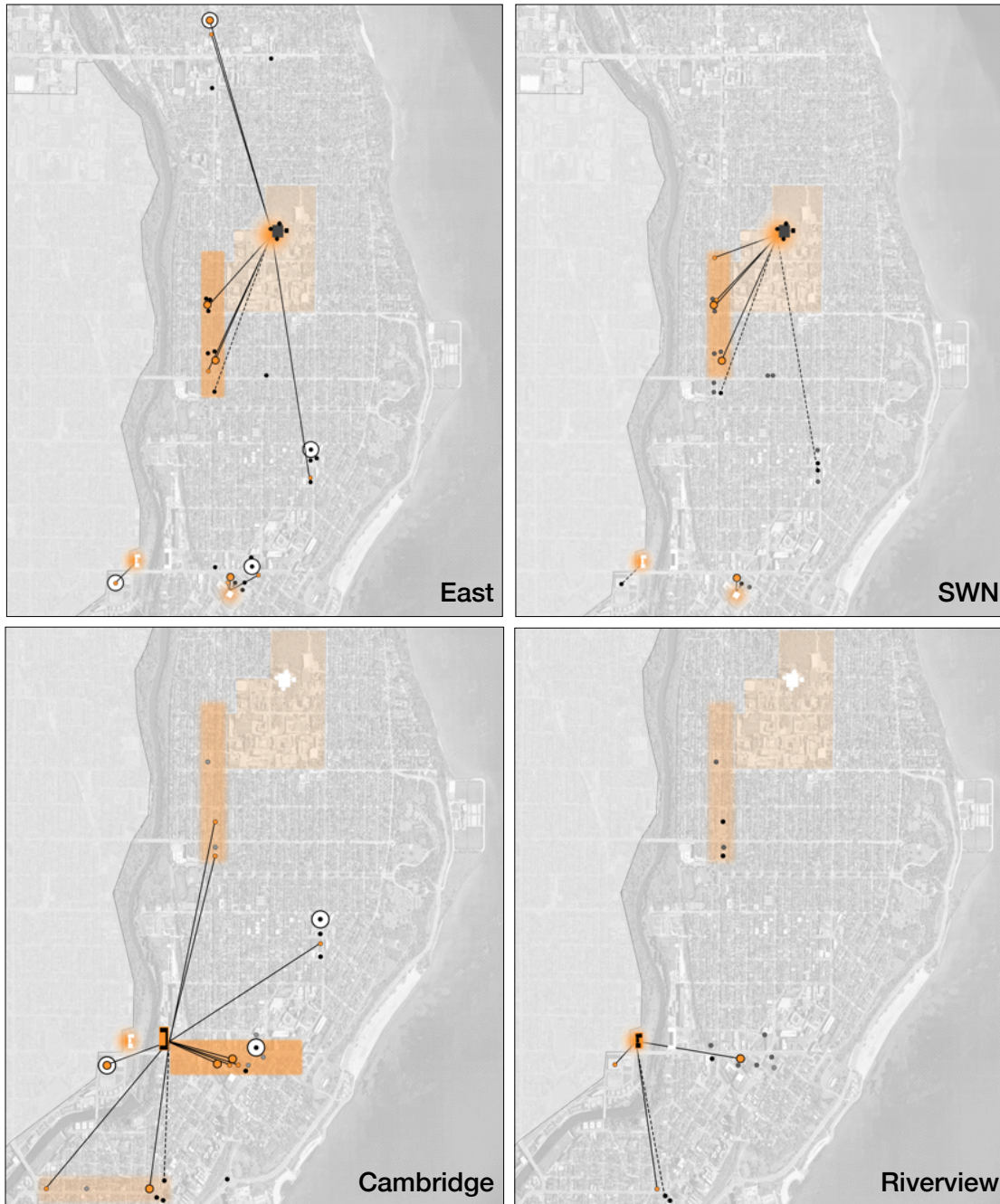
Figure 32: Residence Halls and Grocery Connections.

Neighborhood belonging

Places mentioned more than once in the focus group

Places mentioned once in the focus group

Place-type mentioned in the focus group and / or chosen in the survey responses

Grocery Store

Sandburg East students mention visiting the Metro Market to the north on Oakland avenue.

This helps to explain why East students, who have in-suite kitchens, visit the north zone of

Oakland and SWN students, who do not have kitchen access, do not. This also helps to

explain East's students' greater activity to the south of campus, and helps to explain the

different neighborhood community measures between East and SWN even though all of the

Sandburg students share the same location within the city. The location of grocery stores likely

also plays a role in the spread of areas that are visited by Cambridge students and the lesser

spread of Riverview residents.

4.3.4. Findings: Community — Conclusions

As discussed in the introduction to this section, the influence of social groups has a

powerful effect on an individual's behaviors through the social diffusion of attitudes,

expectations, and shared norms (Figure 16, page 76). As demonstrated in the preceding

introduction to community related findings, a residence hall resident's sense of belonging to

both their residence hall community and their local neighborhood community does correlate to

their performance of ecologically responsible behaviors in their daily lives (Table 15, page 77

and Table 16, page 78).

In the focus groups discussions, when talking about reasons that the students don't always

behave ecologically even though they agree they ought to, most of their justifications fit into

one of three themes (Table 51).

Data tabulated from Focus Group Narrative / Motif Coding				
	Cambridge	**East**	**Riverview**	**SWN**
"Officials are responsible"	I	II	II	II
"Why care if no-one else does?"		I	III	II
"One can't make a difference"		I	I	II

(number of times expressed - Focus Group Narrative / Motif Coding)

Table 51: Focus Group Coding Tabulation Table: Expressions of Inefficacy Motifs.

First, *"officials or institutions are responsible, not me."* Whether referring to themselves or speaking about students from other residence halls, all of the students in all of the focus groups generally feel that UW-Milwaukee is at fault for most of the poor ecological behaviors happening on campus. One student from SWN stated in reference to UW-Milwaukee, "They don't care as much. So its like do we care as much? Probably not…" A second motif is *"Why care if no-one else does?"* There is a general sense, especially in the Sandburg Towers and Riverview, that other students don't care and this social norm is used to explain why their own behavior isn't ecologically responsible. A final motif that students express as a reason for not acting ecologically is that *"one person can't make a difference."* In all of the residence halls there is a general feeling that there is simply too much for one person to understand and to deal with. A student from Riverview said, "I feel like I'm probably like one of over seven billion people on this planet, so what difference can one person make?"

In all of these cases, a strong sense of community seems to lessen the power of these negative social motifs, lessen the students' sense of individual inefficacy, and strengthen their social and individual ecological identities — as demonstrated by the residents of Cambridge Commons.[191]

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[191] Nicholas Nash and Alan Lewis, "Overcoming Obstacles to Ecological Citizenship: The Dominant Social Paradigm and Local Environmentalism," in *Environmental Citizenship*, ed. by Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 159, 175-176.

4.4. Findings: Place
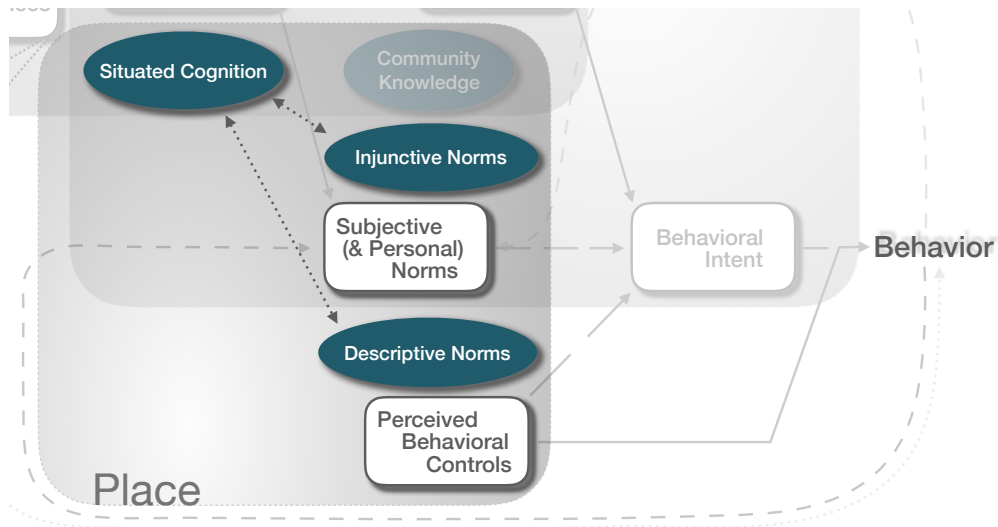
Figure 33. Place in the Ecological Behavioral Framework (Detail).
Based on the work of Figures 8 through 11 and their corresponding sections.
Embedded in the Ecological Behavioral Framework are components that relate to directly to theories of Place including but not limited to Injunctive and Descriptive Normative Influence (also: perceived behavioral controls, norms as well as theories of situated cognition, environment behavior studies, behavior settings).

Ecological identity is defined as someone who views themself as acting pro-ecologically.[192]

In the Ecological Behavioral Framework diagram the concept of place relates to ecological behaviors through its relationship to two elements in the framework (Figure 33). First, through Perceived Behavioral Controls. There are moments in the built landscape of each of the residence halls that make certain behaviors more or less accessible and seem more or less easy. As discussed in this study's theory chapter, physical settings have a significant effect on cognition (see pages 30-33). The built landscape affects a persons perceptions about potential actions, and action possibilities that are either not perceived as easy or are not made apparent

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[192] Sverker C. Jagers, Johan Martinsson, and Simon Matti, "The Environmental Psychology of the Ecological Citizen: Comparing Competing Models of Pro-Environmental Behavior," *Social Science Quarterly* (2016): 3.

by the built landscape are far less likely to be acted upon than behavioral choices that are easy and/or visibly obvious.[193]

The second element of the Ecological Behavioral Framework that is directly affected by physical setting is Subjective and Personal Norms. As described in Chapter 2.4. Place Theory, normative influence has a powerful affect on behaviors and a portion of this influence is communicated through direct observation of others in a social group (pages 30-33). If a built landscape does not allow pro-ecological actions to be readily visible, these behaviors will have minimal normative influence on social peers.

Most of the students in this study know that they ought to recycle and conserve energy: 100% of the students who participated in the survey answered that they think recycling is a behavior that they ought to incorporate into their daily life; 92% of the students answered that they think they ought to conserve energy (Table 52).

Data tabulated from Survey: Question 18: "Choose up to three green behaviors that you think are important to incorporate into your daily life"		
	Recycling	**Conserve Energy**
Percentage of Positive Answers	100%	92%

Table 52: Survey Percentages Table: Ecological Behavior Beliefs.

All of the focus group students said that they thought recycling and energy efficiency are important. However, self-described behaviors, from both the survey and focus groups, suggest that some of these same students do not recycle and do not pay attention to their energy usage (Table 53).

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[193] Mckenzie-Mohr, *Fostering Sustainable Behavior,* 124.

Data tabulated from Survey: Recycling: questions 28, 32 Energy: questions 25, 26		
	Recycling	**Conserve Energy**
Mean of all Respondents	*2.32*	*2.78*
F Ratio	37.20	23.49
p Value	< 0.0001	< 0.0001

(1= good, 5= poor)

Table 53: Data from ANOVA Analysis Tables: Ecological Behavior Self-Reporting.

This study proposes that the built landscapes of the residence halls plays a significant role in these inconsistencies and asks: ***Are there aspects of the built landscapes of the residence halls that hinder (or help) ecological behavior patterns despite students' sense of ecological responsibility?***

An analysis of the focus group discussions using versus coding furthers this hypothesis. A tabulation of all of the instances where a student who has agreed that they ought to act in an ecologically responsible way mentions that they do not if the responsible action is not easy shows that personal actions are affected by perceptions of ease. For example, one of the students from SWN described "I feel like if they made it easy, if it actually smelled better, then I could actually be in there for more than five seconds, I feel like it would be… Honestly it wouldn't even be that bad to recycle then." The fact that these tabulations, of students not acting if actions are not perceived as easy, differ greatly between the residence halls suggests that the different built landscapes of these four residence halls have different normative influences on the residence hall residents (Table 54).

Data tabulated from Focus Group Versus Coding				
	Cambridge	**East**	**Riverview**	**SWN**
Will Not Act If Not Easy	I	I	IIIII I	III

(number of times expressed - Focus Group Versus Coding)

Table 54: Focus Group Coding Tabulation Table: Expressions of Action Only If Easy.

The following analyses will explore the relationships between the physical settings of the residence halls and specific behaviors relating to recycling, waste, and energy use.

4.4.1. Findings: Place — Recycling and Waste

As described earlier, all of the students who participated in this study believe they ought to recycle. However, when addressing their actual behaviors, many of these same students are not careful to act in accordance with their values and do not always recycle. Measures of residence hall residents' recycling behaviors show variation between the residence hall student groups (Table 55).

Question 28: "How careful are you about recycling your trash?"				
	Cambridge	**East**	**Riverview**	**SWN**
I always recycle	36	20	16	0
I usually recycle	4	14	18	34
I sometimes recycle	0	0	2	2
I rarely recycle	0	0	0	1
I never recycle	0	0	0	0
Mean Value = 2.32	1.78	2.19	2.39	2.97

(Survey question 28) $F = 37.20$, $p < 0.001$

Table 55: Survey Tabulation Table: Recycling Behavior Self-Reporting

The normative social influence of a residence hall floor community can account for some of this variation but the built landscape can also operate as a more direct source of behavioral influence. Normative influence can affect behavior through two forms of pressure that stem directly from the built environment: injunctive norms which come from the direct observation of others' behaviors; and descriptive norms which come from observations of the condition of an environment. Both of these sources of behavioral influence, visibility and spatial quality, reflect spatial design choices that can help to explain the variation seen in the survey analysis results.

This leads this study to hypothesize that students recycling behavior is in part influenced by the locations and qualities of the spaces on each residence hall floor that are associated with the recycling process. This study asks: *Are there differences in the locations and qualities of spaces associated with recycling that can account for the measurable differences in recycling behaviors between the residence hall student groups?*

Much of the focus group discussions that addressed recycling behaviors centered around the unpleasant conditions of the trash rooms which are located on each residence hall floor. SWN students used words like "disgusting," "gross," "sticky," and "creepy." In their focus

group one SWN student described: "It smells so bad. Like you don't even want to walk in there because the floor is all garbagy and grimy, and you walk in their and you leave and your shoes are sticking to the floor…" Students from East and Riverview echoed these sentiments, but less strongly. Only one student from Cambridge complained about the smell in their trash room. The number of complains in the focus groups for each residence hall seems to align with the survey analysis results, suggesting that this data is reflective of actual conditions within the residence halls (Table 55 and Table 56).

Descriptions of Trash Room Data tabulated from Focus Group Attribute Coding				
	Cambridge	**East**	**Riverview**	**SWN**
"Overflowing"		III	II	I
"Smelly"	I		II	IIII
"Disgusting" / "Gross" / "Sticky" / "Biohazard"		I		IIIII I
"Dark" / "Creepy"				II

(number of times expressed - Focus Group Attribute Coding)

Table 56: Focus Group Coding Tabulation Table: Descriptions of Trash Rooms.

Dirty and smelly trash room conditions create negative descriptive norms and communicate to the residence hall students that the process of dealing with waste and recycling is unpleasant and that disorganized and overflowing conditions are normal. This in turn encourages the students to spend as little time and effort as possible dealing with their recycling. One of the students from SWN, who claims to care about recycling, says that when she has to deal with bringing recycling to the trash room "so it's like, even me, I like reach in touching the wall so I don't have to step in there." The condition of the trash rooms in SWN, and to some extent in Riverview and East also, are an obstacle to students who want to behave in an ecologically responsible way.

A second recycling issues that was raised by students in the in the focus groups is that the trash room locations do not make recycling easy. Students complained that the trash rooms are unlabeled and the student residents of SWN especially describe how their trash room is also tucked away around a corner and is hard to get to. One student from SWN stated, "I don't think some people actually know for sure the location of the trash room — because it's not like labeled, there's no plaque in front of it, it just looks like another door." The fact that students residents from some of the residence halls perceive the trash rooms as both hard to get to and essentially invisible has injunctive and descriptive normative influences.

The behavioral results of these pressures can be examined by comparing the results of survey data analysis and the residence hall floor plans (Table 55; Figures 34 and 35).

SWN   East

Figure 34: East and SWN Trash Rooms.

Riverview   Cambridge
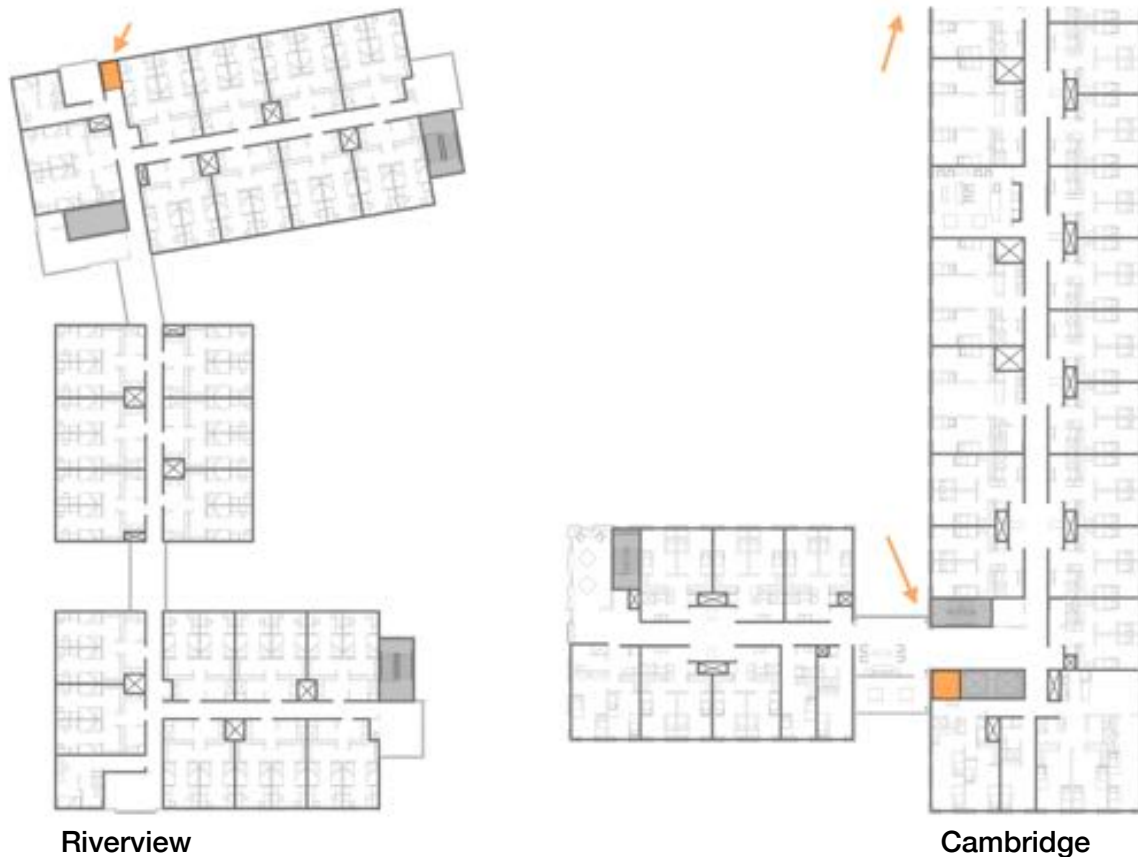
Figure 35: Riverview and Cambridge Trash Rooms.

In Sandburg East the trash room is adjacent to the commons area but is unlabeled. In SWN,

the trash room is unlabeled and is located on the other side of the elevator core from the floor

commons area. In Riverview, the trash room is tucked away at the end of a secondary corridor.

The only residence hall that makes the trash room both visible and easily accessible is

Cambridge where the trash rooms are located proximate to primary circulation and social

spaces, and are clearly labeled. These differences reflect in the measures of recycling

behaviors gleaned from survey data analysis using a one-way ANOVA, between-subjects

design (Table 55, page 135). Results show Cambridge students, whose trash room is well

located and well labeled, rate the best. East students whose trash room is well located but not

well labeled rate above the mean but not as well as Cambridge. Riverview students whose

trash room is labeled but located away from any central common space rate more poorly than

the mean. And SWN students, who complain about their unlabeled and hidden trash room, rate the worst.

A final recycling issue uncovered by this study stems from a built environment condition that differentiates SWN from the other three residence halls. In Sandburg SWN there is a location next to the common lounge where there is a common recycling container and garbage can (Figure 36).
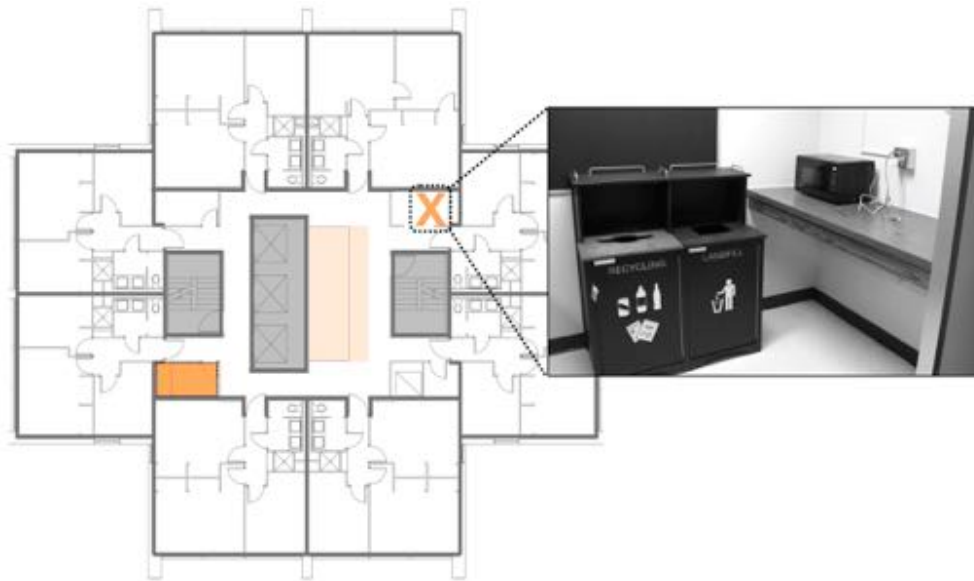
Figure 36: SWN Commons Lounge Trash.

According to the focus group discussions, SWN students tend to empty their suite's recycling and garbage into these containers instead of bringing them to the trash room. Once trash and recycling are left in this location, there is no-one who is apparently accountable for removing the pile from this area and taking it to the trash room. This location disperses and confuses responsibility for trash and recycling before it makes it to the trash room. The trash and recycling piles up in this location and the students described:

It's disgusting how people just pile up garbage in the trash receptacle. They have no remorse about piling it up and not even going to the trash chute and putting it down there. — And people barely use the recycling bin and then they'll just pile up garbage and they won't even attempt to put it in the trash room. — It's a biohazard. — It's just disgusting. It smells.

Having a highly visible location where recycling is left to pile up injunctively and descriptively communicates an uncaring attitude to the recycling process. This issue, which SWN alone faces, can help to account for the significantly poor rating expressed in the survey analysis of recycling habits (Table 55, page 135), and help to account for the break from the correlational relationship that seems to exist between the four student groups' sense of community and their self-reported recycling behaviors (Table 57).
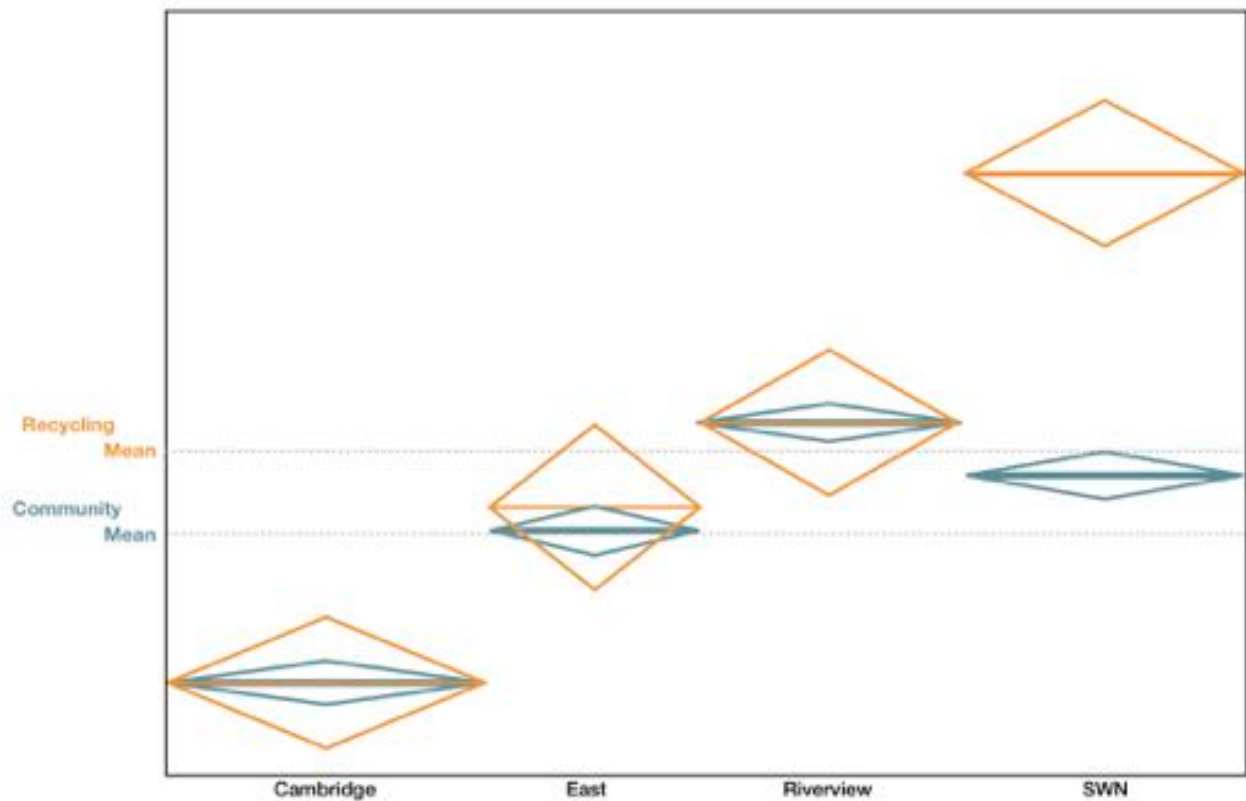
Table 57: Data from ANOVA Analysis Graphic: Residence Hall — Community and Recycling.

There is also a general sense in all of the residence halls that an individual can't make a difference if others in their suite or on their floor mess up the recycling. In the residence halls where there is a lesser sense of community, this causes a sense of inefficacy about group recycling and lends to a sense that a person is primarily responsible only for themselves. Riverview students describe how their one big suite recycling container (located in the bathroom) is often not dealt with until it is overflowing: "so there're four people sharing one recycling bin. Which usually gets overfilled a lot. Because people just wouldn't go and take it

down to the recycling room." Another Riverview student recounted: "I think [my suite-mates] must think the recycling bin is just a trash can. Cause literally I'll find like food, like pizza boxes that have like half the pizza in em and like half full like bear cans and its like, 'okay, um that's cool.' Roommate doesn't do it at all, like I'll find like cardboard boxes that could be recycled like literally stuffed in our trash." Most students in Riverview and SWN feel that if someone else messes up the recycling, puts non-recycling in with the recycling, it will stay messed up and go into the trash room as is. As described in Chapter 4.3.1. Findings: Community - Residence Hall Floor, students in Riverview and SWN are not comfortable confronting other residents about their poor recycling behaviors (pages 85-87). This type of visible disorder, especially present in SWN, perpetuates an ethos of uncaring.

This study noticed a final trend related to kitchens that was made apparent during the focus group discussions that relates to the production of waste. All of the suites in East and some suites in Cambridge have kitchens which include refrigerators as well as cupboards and drawers. In Cambridge, the suites that don't have kitchens still have large refrigerators and adjacent cupboard storage for cooking and eating related accoutrement (Figure 37).

↑ Cambridge Kitchen

Cambridge no Kitchen →

← East Kitchen ↓

Figure 37: Cambridge and East Kitchen-Related Storage.

During the focus group discussions it seemed that one effect that kitchens have on residence hall residents' behavior is to help students produce less waste. Therefore this study asks: *Is there evidence that the kitchen storage in Cambridge and East help those students produce less waste?*

A common complaint expressed by Riverview and SWN residents in the focus groups while discussing behaviors and habits related to recycling is that they don't have enough storage for items related to eating: plates, utensils, cups, etc. Therefore, even though they know that it is not ecologically sound, a common solution is the use of disposable eating-ware. One student from Riverview describes how "you take all the throw-away plastic stuff from wherever you can find it." Another Riverview resident accounted how "there's … not too much space. My roommate, she has a drawer thats just full of plastic utensils" that they both use. Though the students know that this is not ecologically sound behavior, it is easier than finding storage for eating-ware within the limited space of their suite and rooms.

The use of disposables was not mentioned in the Cambridge and East focus group discussions. An East student described "there are some people in my suite that cook a lot. I don't cook a ton but I like to have the storage space for food stuff, and I like to have the stove to make tea and stuff like that, and the microwave right in the suite is nice." Cambridge and East students have storage for food and cooking/eating related stuffs and therefore don't resort to habits that run counter to their stated ecological values.

These trends, which were gleaned from from focus group discussions, are backed up by an analysis of item 43 from the survey: "*When you get coffee or tea to go at a shop how often do you use your own travel mug?*" An analysis using a one-way ANOVA, between-subjects design reveals a statistically significant correlation between having kitchen storage and the use of a travel mug (Table 58).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Kitchen vs. No-Kitchen Groups and Use of Travel Mug measure					
	mean	Kitchen	No-Kitchen	F Ratio	Prob > F
Travel Mug Use measure	3.62	2.90	4.32	79.07	< 0.0001

(Survey question 43) (1= good, 5= poor)

Table 58: Data from ANOVA Analysis Tables: Kitchens and Travel Mug Use.

This suggests that not only do kitchens offer students a place in which to anchor community-based ecological identity as discussed in Chapter 4.3.1. Findings: Community — Residence Hall Floor, kitchens are also a feature of the built landscape that allow students the space and storage to support ecologically sound behavioral choices relating to waste and consumption habits (page 95-97).

4.4.2. Findings: Place — Energy

As described earlier in the introduction to this section, most of the students who participated in this study know that they ought to conserve energy. Self-reported energy use via the survey however, shows that students, especially the residents of the Sandburg Towers, are not rigorous about ecologically responsible energy use habits (Table 59).

Data from ANOVA Summary Table for Study Investigating the Relationship between: Residence Halls Groups and Energy Mean					
	mean	Cambridge	East	Riverview	SWN
Energy Mean	2.67	2.31	2.69	2.61	3.51

(Survey question 25, 26) (1= good, 5= poor)   F = 23.49, p < 0.0001

Table 59. Data from ANOVA Analysis Table: Residence Halls Groups and Energy Mean.

The survey data matches data from the focus groups where, when asked about energy efficiency habits, the students of East and SWN both repeatedly mention lights that are left on at all times while students from Riverview and Cambridge do not (Table 60).

Data tabulated from Focus Group Hypothesis Coding				
	Cambridge	East	Riverview	SWN
Mentions of Lights Left On		IIII		IIIII II

(number of times expressed - Focus Group Hypothesis Coding)

Table 60: Focus Group Coding Tabulation Table: Mentions fo Lights Left On.

This leads this study to postulate that there are conditions of the built environment that differ between the residence halls and affects the students' behaviors relating to lighting. This study asks: *What differences exist between the built landscapes of the residence halls that affect the students' ecological behaviors relating to lighting?*

Floor plans of the residential levels of East and SWN show that there are large central areas that receive no natural lighting (Figure 38).
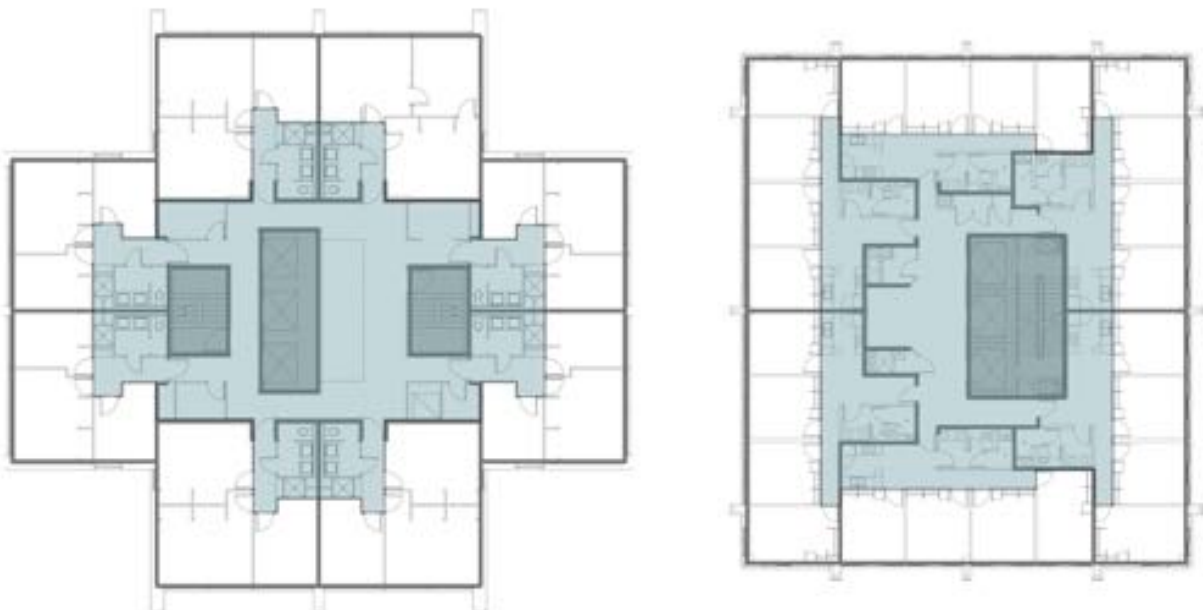
Figure 38. East and SWN Areas with No Natural Light.

In these spaces, lights are left on at all times. Students in the focus groups report having no knowledge whether or not these lights are energy efficient. Again, this causes issues having to do with descriptive norms. The students of East and SWN see that there are lights that are left on twenty-four-seven. This creates a normative suggestion that "lights-on" is the normal condition for their environment, and this is reflected in the measures of self-reported energy use for East and SWN (Table 59, page 144).

In opposition to this, one of the students in the Cambridge focus group described how motion-sensor lights in some of the common areas on his floor help him to remember that "lights-off" is normal, and how because of this he finds himself being more careful about turning off lights in the spaces he controls.

> The study rooms have automatic lights. The bathrooms have automatic lights. It kind of gets me into the habit of actually turning off the lights when I don't need them. … By having motion sensors. Say, like the studio there, I use that a lot. Like if I'm working on something it just like turns off if you don't move a lot. So if I'm like in my room and I'm on my laptop and I don't really need it on, I'll be thinking 'huh, it's weird that the light is on,' I'm used to it being off because of the studio.

The LEED credit: *Interior Lighting* requires that multi-occupant spaces have a minimum of three occupant controllable choices for lighting: on, off, and a mid-level.[194] Beyond offering occupant control, this study's investigation suggests that lighting that react to activity can be thought about as a means of communicating ecologically descriptive norms.

4.4.3. Findings: Place — Conclusions

The physical landscape of a residence hall has the potential to affect student residents' ecological behaviors in a couple of ways. First, aspects of the built environment control perspectives about how easy or accessible an ecologically responsible action will be. The

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[194] See: U.S. Green Building Council. *LEED v4 for building Design and Construction, updated July 8, 2017*. https://www.usgbc.org/resources/leed-v4-building-design-and-construction-current-version.

physical landscape of a residence hall also affects normative influence on residents' behavior. The built landscape can make certain actions more or less visible, can integrate certain processes into the daily spaces of residence hall students, and can help to define what conditions are considered normal. In the Ecological Behavioral Framework these influences are expressed through the elements Subjective and Personal Norms, and Perceived Behavioral Controls (Figure 33, page 131).

This section of this study's analyses has shown that variations in the built landscapes of the residence halls can and do contribute to differing behavioral outcomes through injunctive and descriptive normative influence. A built landscape that supports ecologically responsible behaviors can potentially have a powerful influence on the formation of a students' ecological responsible daily habits and the growth of their ecological identity.

4.5. Findings: Education
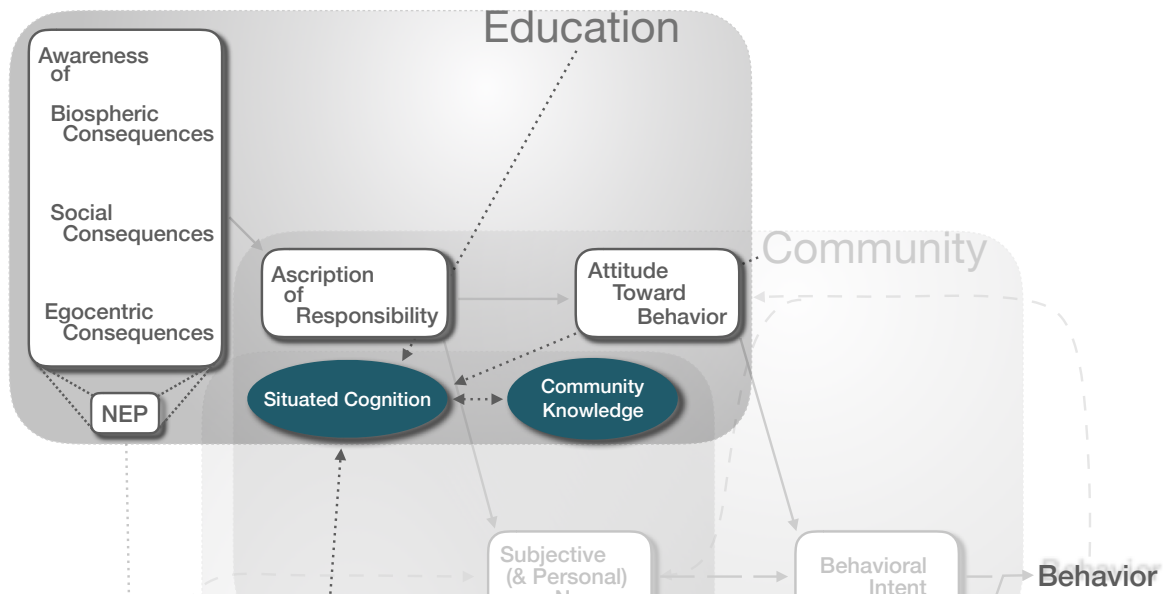
Figure 39. Education in the Ecological Behavioral Framework (Detail).
Based on the work of Figures 8 through 11 and their corresponding sections.
Embedded in the Ecological Behavioral Framework are components that relate to directly to theories of Education including but not limited to situated learning, communities of practice, behavior settings (also: awareness, responsibility, attitudes as well as theories of situated learning and cognition, communities of practice, citizenship theory, etc.).

Education has been shown to be essential to the development of sustainable attitudes. People learn best when they know how to get something done; are supplied with the knowledge and understanding that will support attitudes and values that are shared by a community.[195] There are a number of issues that students expressed repeatedly in the focus groups that relate to moments in their daily lives where they do not act ecologically due to a lack of knowledge and/or awareness. These issues can be delineated into two types of conditions where situated knowledge and place-specific awareness is lacking and lends to the residence hall residents not acting in ecologically responsible ways. First, there are moments in the daily lives of the students where they are simply unsure what actions are ecologically correct. Second, there are times in their daily lives where the residence hall residents forget

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[195] Jagers, "In Search of the Ecological Citizen," 27, 32.

that their actions have larger ecological consequences (Figure 39). This study asks: *Are there spaces in the daily lives of the residence hall residents where specific information could aid the students and help to support knowledgeable and responsible ecological behaviors?*

Residence halls are an ideal place where knowledge can be situated and ecological learning can happen in connection with community, activities, and physical context.[196] This study looks for moments in the daily lives of the residence hall students where additional knowledge could aid the residents toward improved ecological behaviors.

A common complaint brought up in focus group discussions is that the students don't always know what to recycle. Usually they guess; one student will call her mom to ask — in general they try, but the fact that the residents are aware that they don't always do it right lends to a sense of inefficacy. One East resident described "So I think I'm good but like sometimes you put the stuff in the wrong bin not knowing; like I try, I have good intentions, but…" A student from Riverview said "I like try to, I think a certain thing goes in the recycler and then someone will be like 'oh well this goes over in recycling, this is garbage' and I'm like 'well I tried,' so I try, but it like fails at times, but that's just because I don't always know if this belongs in the recycling or something." The residence hall students seem find their lack of knowledge defeating. As described in an earlier section of this chapter, students feel that if one student make a mistake and puts garbage in the recycling, this will ruin all of their efforts. The fact that students are frequently unsure of how to act ecologically lends to a sense of inefficacy.

The second education-related excuse that residence hall residents often give for not consistently behaving in an ecologically responsible way is that students find it difficult to

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[196] Allan Collins, John Seely Brown, and Susan E. Newman, "Cognitive Apprenticeship: Teaching the Craft of Reading, Writing, and Mathematics," in *National Institute of Education* (Technical Report No. 403, January 1987), 1; Dobson, *Citizenship and the Environment,* 177; Gough and Scott, "Promoting Environmental Citizenship through Learning," 266; John Seely Brown, Allan Collins, and Paul Duguid, "Situated Cognition and the Culture of Learning," *Educational Researcher* 18, no.1 (Jan-Feb 1989): 32-33., 41; John Seely Brown and Paul Duguid, "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation," *Organizational Science* 2, no.1 (February 1991): 47.

recognize and remember how their daily habits connect to larger global-scale concerns. One East student in his focus group said: "…because it doesn't directly affect students. Like sure, there's a huge land mass of plastic floating in the Pacific, but since students don't know about it, or they don't see it, or they don't think about it, they don't care." It is possible for the built landscape of residence halls to function in a way that both connects students to larger ecological concerns and reminds them of this connection, both generally and at relevant behavioral moments; but without place-specific cues students will often forget to connect their daily behaviors and habits with a larger ecological worldview.

It is likely that the two ecologically focus LLCs housed in Cambridge have a significant educational and cognitive influence on the daily lives of the Cambridge students through contributions to shared community knowledge and social values. This is a situation that deserves further study. Though this dissertation collected data that allows for productive comparisons between all of the residence halls, there is not enough data specific to Cambridge to delve into an exploration of the complex milieu of ecological behavioral influence within its built landscape that could help to account for the extremely positive ecological measures of the Cambridge students found throughout this study's findings.

However, this study's findings do suggest that these sustainable LLCs do play a role in the students' ecological behavioral learning and the development of their ecological identities. And the findings hint at a series of questions that could be used to develop a new survey and focus group discussion guide: Do the LLCs have ecological learning objectives the affect student culture? Do the sustainably focused LLCs hold regular meetings? If so, how often? How many students attend? What topics are addressed? Do the LLCs have any programs that work toward improving daily ecological behaviors and/or ecological awarenesses? Are the student members of these LLCs given anything that would aid in their daily behavior patterns (for example: travel mugs or reusable shopping bags)?

Though this dissertation is unable to address these specific questions, the findings of this study demonstrate that Cambridge is an extremely successful ecological behavioral setting

that deserves further study. An in-depth examination of Cambridge's built environment using this dissertation's research methodology and the Ecological Behavioral Framework has the potential to uncover significant results.

4.6. Findings: Conclusions

This dissertation is founded upon the premise that each of the four residence halls' different built landscapes affects the student residents' experience and that these different experiences result in differing ecological awarenesses and ecological identifications. This chapter has reviewed this dissertation's findings. Analyses of both the survey data and the focus group discussions, which compare student groups from the different residence halls, reflect very different ecological behaviors, behavioral intentions, habits, attitudes, perceived social norms, values, and worldviews; and demonstrate that there are statistically significant differences between the ecological behaviors of residence hall students groups. The investigations are organized into three sections based on the three theoretical realms that are tied into this study's Ecological Behavioral Framework: community, place, and education (Figure 13, page 42). The exploration of each section highlights moments where the built environment of the residence halls directly or indirectly affects the social, physical, or cognitive environments of the residence hall students in a way that has the potential to influence their environmentally significant behaviors and/or ecological learning.

The Ecological Behavioral Framework for this study is designed to function as a scaffold through which to explore these relationships: between the everyday built landscapes of the residence halls and the learning and support of environmentally sustainable behavior patterns. Though this framework is not an absolute representation nor is it comprehensive, it does allow this study to explore specific moments within the complex behavioral settings of the residence

halls where the data suggests the built landscape directly or indirectly affects the students' ecological behavioral choices or the growth of their ecological identities.

This study assesses these differences in ecological identification between the residence hall student groups by organizing the analysis around each of the Ecological Behavioral Framework's theory categories. First, community: this study explored relationships that link the built environment of the residence halls directly and indirectly to constructions of the students' sense of community. This study determined that a strong sense of community can help contribute to the formation of an ecological identity through the social diffusion of Attitudes, values, and shared Norms; and that the conditions of the built landscape of a residence hall play a role in the growth of this community.[197] Inquires at three scales of analysis demonstrate that a residence hall resident's sense of belonging to both the residence hall community and the local neighborhood community does correlate to their ecological identity, and therefore that moments when the built environment of the residence halls help or hinder the growth of the students' sense of community can in turn affect the learning and performance of ecologically responsible behaviors in their daily lives. A strong sense of community lessens the students' sense of individual inefficacy, and strengthens their social and individual ecological identities, as exemplified in this study by the residents of Cambridge Commons.[198]

Next, this dissertation explored findings related to place theory. The physical landscape of a residence hall has the potential to affect student residents' ecological behaviors in a couple of ways. As discussed in this study's Theoretical Framework chapter, physical settings have a significant effect on cognition. Behaviors are performed within social and physical environments that lend to understandings of which actions are appropriate and expected.[199]

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[197] Nash and Lewis, "Overcoming Obstacles to Ecological Citizenship," 159; Shin, "Toward a Theory of Environmental Satisfaction and Human Comfort," 14.

[198] Nicholas Nash and Alan Lewis, "Overcoming Obstacles to Ecological Citizenship: The Dominant Social Paradigm and Local Environmentalism," in *Environmental Citizenship*, ed. by Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 159, 175-176.

[199] Roger G. Barker and Herbert F. Wright, "Psychological Ecology and the Problem of Psychosocial Development," *Child Development* 20, no.3 (September 1949): 136-137.

Injunctive normative influence has a powerful affect on behaviors and a portion of this influence

is communicated through the visibility of others' behaving within a setting; and descriptive

normative influence communicates behavioral expectations through the condition and layout of

a built landscape. Through these normative influences the built landscape affects a persons

perceptions about potential actions, and action possibilities that are either not perceived as

easy or are not made apparent by the built landscape are far less likely to be acted upon than

behavioral choices that are easy and/or visibly obvious.[200] The built landscape can make

certain actions more or less visible, can integrate certain processes into the daily spaces of the

residence hall students, and can help to define what conditions are considered normal. This

section of this study's analysis shows that variations in the built landscapes of the residence

halls can and do contribute to differing behavioral outcomes through injunctive and descriptive

normative influence. In the Ecological Behavioral Framework these influences are expressed

through the elements Subjective and Personal Norms, and Perceived Behavioral Controls.

Finally, in the educational theory exploration, this study looked at residence halls as an

ideal place where knowledge can be situated and ecological learning can happen in

connection with community, activities, and physical context.[201] This study looked for moments

in the daily lives of the residence hall students where additional knowledge could aid the

residents toward improved ecological behaviors, and highlighted moments where the built

landscape of residence halls could function in a way that both connects students to larger

ecological concerns and reminds them of this connection, both generally and at relevant

behavioral moments. These types of instances link to the Ecological Behavioral Framework's

variables Awareness of Consequences and Ascription of Responsibility.

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[200] Mckenzie-Mohr, *Fostering Sustainable Behavior,* 124.

[201] Allan Collins, John Seely Brown, and Susan E. Newman, "Cognitive Apprenticeship: Teaching the Craft of Reading, Writing, and Mathematics," in *National Institute of Education* (Technical Report No. 403, January 1987), 1; Dobson, *Citizenship and the Environment,* 177; Gough and Scott, "Promoting Environmental Citizenship through Learning," 266; John Seely Brown, Allan Collins, and Paul Duguid, "Situated Cognition and the Culture of Learning," *Educational Researcher* 18, no.1 (Jan-Feb 1989): 32-33., 41; John Seely Brown and Paul Duguid, "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation," *Organizational Science* 2, no.1 (February 1991): 47.

These analyses show that this dissertation's methodology has the potential to uncover statistically significant factors within the built environment of these residence halls that directly or indirectly affect the ecological identities of the different student groups and that the Ecological Behavioral Framework can be used as an operational tool to explore an eco-social, behavioral design approach to sustainability. This dissertation demonstrates that a built landscape that supports ecologically responsible behaviors can potentially have a powerful influence on the formation of a students' ecological identity.

5. Discussion

As stated in the Introduction to this dissertation, this study has three objectives. First, this study seeks to add to the ever-growing sustainability dialogues in the field of architecture by espousing a specific eco-social approach to sustainability founded on behavioral theories. By rationalizing and operationalizing a specific Ecological Behavioral Framework this study shows that environmentally significant behaviors and ecological learning can be directly and indirectly correlated with specific elements of a built landscape. Chapter 2 of this dissertation delineates two behavioral theory frameworks that can apply to the study of ecological behaviors and makes an argument that a combined model is appropriate for this study. Educational theory is tied into the Ecological Behavioral Framework, specifically pulling from theories of situated cognition and communities-of-practice; place theories that are relevant to this study are discussed, particularly tying normative theories of place and behavior settings into the behavioral framework; community and identity theories are tied into the Ecological Behavioral Framework. This theoretical framework can be used to explore the mechanisms that relate ecologically significant behaviors with the built landscapes within which they are learned and performed.

In Chapters 3 and 4, this study defines and demonstrates a methodology that uses the Ecological Behavioral Framework to expose moments in the design of university residence halls where the built environment can directly or indirectly play a role in the learning of sustainable behavior patterns and the growth of the students' ecological identification.

Finally, this dissertation intends to produce useful outcomes in order to illustrate the value of a behavioral design approach to architectural sustainability. The intent is that the results of this study can be useful not only to architectural designers, but also to anyone who manages residence hall spaces. Therefore, the final chapter of this dissertation, Chapter 6, is a series of simple, sustainable design ideas in the form of architectural patterns. These sustainable, spatial design patterns help to define built environment moments that can support ecological behavioral-learning and help to sustain ecologically responsible behaviors; and these design

patterns stem directly from the findings covered in Chapter 4. Patterns are an effective means of exchanging spatial ideas outside of design specialties and patterns have been proven to be an effective tool for communicating place needs and integrating design solutions into a built landscape.[202]

By framing a behavioral approach to sustainability and demonstrating that its application can produce useful outcomes, this dissertation illustrates the value of a behavioral design approach to architectural sustainability.

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[202] Weisman, "The Place of People in Architectural Design," 169.

6. Design Strategies

Sustainable Design Patterns

Education

Community

Pattern 16: Place Appropriate Signs
Pattern 17: Ecological Reminders

Pattern 01: Privacy Gradients
Pattern 02: Suite Commons
Pattern 03: Kitchen Community Centers
Pattern 04: Hallways as Social Spaces
Pattern 15: Eco-Communicative Lights   Pattern 05: A Variety of Lounges
Pattern 06: Social Adjacencies
Pattern 07: Central Commons
Pattern 08: Terraces That Connect
Pattern 09: Neighborhood Connections
Pattern 10: Large Refrigerators

Behavior

Pattern 11: A Friendly Trash Room
Pattern 12: A Central Trash Room
Pattern 13: Three-Step Floor Recycling
Pattern 14: Kitchen Storage

Place

Figure 40: Sustainable Design Patterns.

In order for this study to produce outcomes useful to designers as well as residence hall administrators and facilities managers, study results are organized into design patterns. This Chapter is a collection of simple, sustainable architectural design patterns. These sustainable patterns will help to define moments in the built environment of a residence hall that can help to support students' ecological behavioral-learning and help to sustain ecologically responsible behaviors. These design patterns stem directly from the findings covered in Chapter 4 and therefore will follow the same section organization: community patterns at the scales of a residence hall floor, a residence hall building, and at the scale of a residence hall neighborhood; followed by place-related patterns, and finally education-related patterns.

Though these patterns are presented as disparate, they are not. Each pattern highlights a moment within a complex system of relationships where the built landscape of a residence hall can directly or indirectly influence the performance of environmentally sustainable behaviors or ecological behavioral-learning; pattern purviews often relate or even overlap. Nor is this set of patterns meant to be comprehensive. Instead, they are intended to fulfill two functions. First, this series of patterns is intended to exemplify an eco-social, behavioral design approach to architectural sustainability, demonstrating both its viability and usefulness. Second, these patterns constitute the start of a sustainable design language that, hopefully, will be added to and expanded upon through further studies.

Each sustainable design pattern will include:

- A pattern *title* that expresses the core issue addressed by the pattern.

- A description of the study's *findings* that led to the design pattern.

- An *image or diagram* that represents the core built environment requirements defined by the pattern.

- A simple *design suggestion* statement.

- A brief discussion of the *performance criteria* defined by the students' needs and the obstacles they commonly face in relation to each pattern's issue.

- *Questions* that help to determine if a design response addresses the performance criteria.

- A list of *related patterns* from this study.

6.1. Design Strategies: Community

Figure 41: Sustainable Design Patterns — Community.

Environmental sustainability is, at its core, a social issues.[203] The influence of social groups have a powerful effect on an individual's behaviors through the social diffusion of attitudes, expectations, and shared behavioral norms. A strong sense of community helps to lessen students' sense of individual inefficacy, strengthens their sense of environmental responsibility, and improves the growth of their social and individual ecological identities.[204] These influences are expressed through the Ecological Behavioral Framework elements Attitude Toward Behavior, and Subjective and Personal Norms (Figure 16, page 76). As demonstrated in the

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[203] Gough and Scott, "Promoting Environmental Citizenship through Learning," 269.

[204] Nicholas Nash and Alan Lewis, "Overcoming Obstacles to Ecological Citizenship: The Dominant Social Paradigm and Local Environmentalism," in *Environmental Citizenship*, ed. by Andrew Dobson and Derek Bell (Cambridge: The MIT Press, 2006), 159, 175-176.

community findings section of Chapter 4, a residence hall resident's sense of belonging to both the residence hall community and the local neighborhood community is influenced by the built environment of their residence halls; and the students' sense of community positively correlates to their performance of ecologically responsible behaviors in their daily lives and to their measure of ecological identification.

The following ten Patterns address moments where the students' sense of community is affected by aspects of the residents halls' built landscapes. Patterns 01-06 address built landscape features that influence the growth of the students' sense of community on their residence hall floor. Patterns 07 and 08 describe built landscape factors that affect the students' sense of community in the commons spaces within the residence hall buildings. Patterns 09 and 10 define aspects of the residence halls that impact the residents ability to form community bonds within their local neighborhoods.

6.1.1. Design Strategies: Community — Residence Hall Floor

6.1.1.1. Pattern 01: Privacy Gradients

Findings:

An analysis of differences in privacy gradients between the four residence halls of this study and the students' sense of community within their residence hall floors suggests that there is a positive correlation between residence halls that offer students suites with good privacy gradients and residence halls whose students have a strong sense of community on their residence hall floor (pages 90-93).
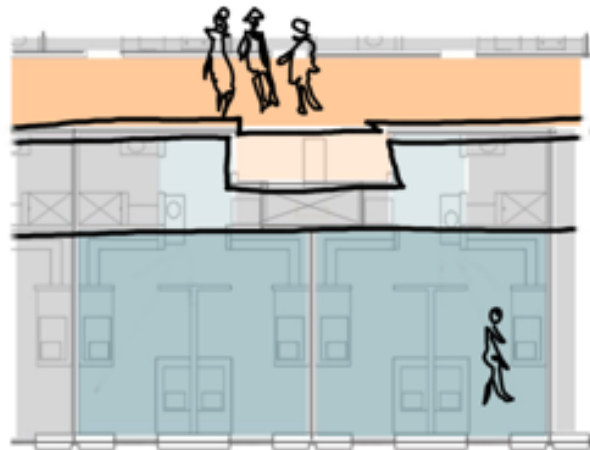
Figure 42: Pattern 01: Privacy Gradient.

Design Suggestion:

A student's room should be separated from the very social space of a residence hall hallway and/or floor common lounges by both a semi-private and a semi-public zone.

Performance Criteria:

Students need a private space where they can retreat away from the social life of a residence hall floor.

A sense of community starts with individual comfort: no one can feel comfortable being social if they do not have a comfortable retreat away from social life. In a residence hall a

student's room is the only space that they fully control and that they can shut off from the rest

of the student population. In order for a student's room to be private, it needs to be separated

from public spaces by both a semi-private and a semi-public zone. If a student's room is

unable to function as a private space, that student will have a harder time forming community

ties.

Questions:

• Is there somewhere that students can socialize within their residence hall suite that is

outside of their room?

• If doors are open, can someone see into a student's private room from the hallway or a

common lounge?

Related Patterns:

Pattern 02: Suite Commons (pages 163-164)

Pattern 04: Hallways as Social Spaces (pages 167-168)

6.1.1.2. Pattern 02: Suite Commons

Findings:

Analysis shows that there is a positive correlation between the size of in-suite commons space and students' sense of community. There are significant differences in both the size and quality of the semi-private common areas within the residence hall suites between the four residence halls; and the residence halls that offer students an in-suite common space that is large enough to function as social space for suite-mates or friends rate the best in measures of community (pages 93-95).

Figure 43: Pattern 02: Suite Commons.

Design Suggestion:

Every suite ought to have a common space in which a small group of suite-mates or friends can comfortably socialize.

Performance Criteria:

Students need a space, outside of their rooms and within their suite, where they can be informally social with their suite-mates and with invited guests.

No social group can exist without the cultivation of each individual's social bonds, and the building of floor-scale community within a residence hall begins within a student's suite. A shared common space within a suite allows students to have a semi-private place to interact with friends and suite-mates, away from the very public social spaces of the residence hall floor, and which does not intrude into the private zone of their room.

Questions:

• Is there a common space within each residence hall suite where a few people can hang out and socialize?

• Is this space comfortable?

• Is the lighting controllable?

Related Patterns:

Pattern 01: Privacy Gradients (pages 161-162)

Pattern 03: Kitchens as Community Centers (pages 165-166)

Pattern 15: Eco-communicative Lights (pages 191-192)

6.1.1.3. Pattern 03: Kitchen as Community Centers

Findings:

Communal eating and cooking brings people together and increases feelings of group membership, and this study's analyses show that there is a strong positive correlation between students' access to kitchens and their sense of community. In this study the students who have easy access to kitchens, either within their suite or on each floor, repeatedly refer to their kitchen as a place that focuses social activities (pages 95-97).

Figure 44: Pattern 03: Kitchen as Community Center.

Design Suggestion:

If there is not a kitchen in every suite on a residence hall floor, there should, at a minimum, be a common kitchen on every floor.

Performance Criteria:

All residence hall residents should have easy, twenty-four seven access to a kitchen.

Kitchens can function as a focus for informal social activities on a residence hall floor. Communal eating and cooking brings people together and increases feelings of group membership. Kitchens can work as a spatial foundation for the building of community on a

residence hall floor and can therefore have a positive effect on the social growth of the students' ecological identities.

Questions:

• Do all residence hall residents have easy, twenty-four seven access to a kitchen?

Related Patterns:

Pattern 02: Suite Commons (pages 163-164)

Pattern 10: Large Refrigerators (pages 179-180)

Pattern 14: Kitchen Storage (pages 189-190)

6.1.1.4. Pattern 04: Hallways as Social Spaces

Findings:

Analyses of survey, focus group, and mapping data shows a positive correlation between strong floor community and residence halls that have hallways that can function as social spaces. Well designed hallways are wide enough to allow residents to briefly socialize with out blocking the general flow of movement, and have moments throughout their length where there are spaces to step out of the flow of traffic. This type of hallway allows for informal, random socialization which can function to support the growth of the students' sense of community (pages 97-99).

Figure 45: Pattern 04: Hallways as Social Spaces.

Design Suggestion:

Hallways in a residence hall should be design as social spaces: wide and with social nooks.

Performance Criteria:

Hallways in a residence hall need to function as spaces where students can comfortably stop and socialize.

Pathways and thoroughfares, when well crafted, can function as social spaces. Well designed hallways encourage casual and unplanned socialization which can help to support the growth of the students' sense of community within their residence hall and thus affect the social growth of the students ecological identity.

Questions:

• Can students stop to talk within the space of the hallway on their residence hall floor and not impede traffic?

• Are there moments where a few students can step aside, out of the traffic zone?

Related Patterns:

Pattern 01: Privacy Gradient (pages 161-162)

Pattern 05: A Variety of Lounges (pages 169-170)

Pattern 06: Social Adjacencies (pages 171-172

Pattern 07: Central Commons (pages 173-174)

6.1.1.5. Pattern 05: A Variety of Lounges

Findings:

Analyses of the study's data shows that residence hall floors that have a variety of types and sizes of lounges available to the students helps the growth of the students sense of community. Offering the residents choices of social spaces supports variability in social encounters, allows for different types of use, and encourages social growth and evolution (pages 99-103).

Figure 46: Pattern 05: A Variety of Lounges.

Design Suggestion:

On each floor of a residence hall, make sure there are a variety of spaces available to students for different kinds of social activities; these common lounges should vary in size, quality of space and light, level of privacy, and offer students different options for furnishings.

Performance Criteria:

Students need to have a variety of spaces available for social activities. Some lounges should be semi-public, some semi-private; some large, some small.

Residence hall lounges are spaces that function to support the social life of residence hall residents. Students should have a variety of spaces — that differ in size, quality of space and light, level of privacy, and types of furnishings — as options for social spaces on each residence hall floor. Lounges can help to support the growth of the students' sense of floor-scale community within their residence hall and thus affect the social growth of the students ecological identity.

Questions:

• Are there different kinds of spaces available for students to socialize in on each residence hall floor?

• Are there social spaces available on each floor that offer different levels of privacy?

Related Patterns:

Pattern 03: Kitchens as Community Centers (pages 165-166)

Pattern 04: Hallways as Social Spaces (pages 167-168)

Pattern 06: Social Adjacencies (pages 171-172)

Pattern 07: Central Commons (pages 173-174)

6.1.1.6. Pattern 06: Social Adjacencies

Findings:

Analyses show that floor lounges that are located adjacent to major pathways and other social spaces, especially if these spaces include a wide hallway (*Pattern 04*) and a variety of lounges (*Pattern 05*), allows for impromptu social discovery which helps support the growth of the students' sense of community by encouraging informal, random social interactions (pages 103-104).
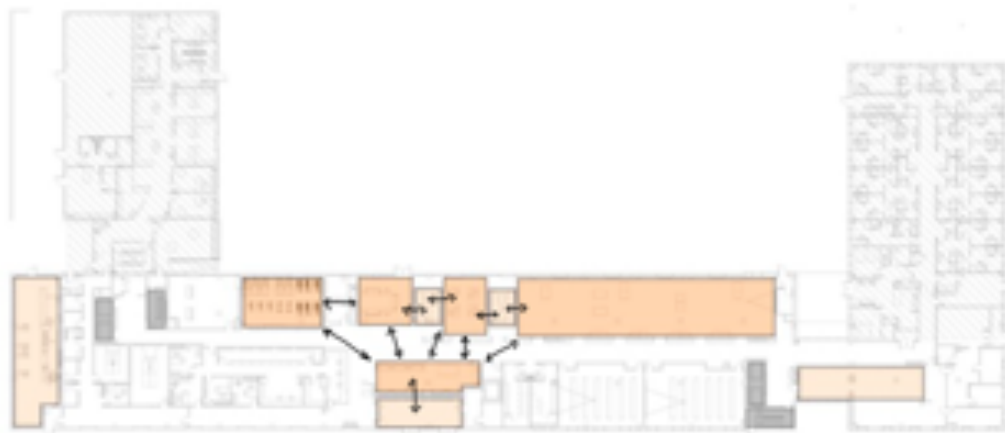
Figure 47: Pattern 06: Social Adjacencies.

Design Suggestion:

Lounges on a residence hall floor should be located adjacent to the main pathway on a residence hall floor and near to other social spaces.

Performance Criteria:

Residence hall lounges need to encourage informal and random social interactions so should be located adjacent to other social spaces and pathways.

Residence hall lounges are spaces that function to support the social life of residence hall residents. Lounges that are adjacent to common pathways and other social spaces help to encourage informal socialization which works to support the growth of the students' sense of

extended community; and through this, can help to support the development of their ecological identity.

Questions:

• Are the social lounges on each residence hall floor next to common paths of travel?

• Are the social lounges near to each other and to other social spaces?

Related Patterns:

Pattern 03: Kitchens as Community Centers (pages 165-166)

Pattern 04: Hallways as Social Spaces (pages 167-168)

Pattern 05: A Variety of Lounges (pages 169-170)

Pattern 07: Central Commons (pages 173-174)

6.1.2. Design Strategies: Community — Residence Hall Building

6.1.2.1. Pattern 07: Central Commons

Findings:

An analysis that compared the building commons spaces in Riverview and Cambridge reveal that centrally located building commons, located on a main floor and near a major building pathway, encourages the growth of students' sense of community, which in turn, correlates to the students' ecological identities. Spaces like cafeterias, dining commons, computer labs, and study lounges should be placed proximate to each other and a major building entrance. This allows for overlapping zones of use and encourages serendipitous social interactions. An expanded social field provides students with greater opportunities for social behavioral-learning (pages 106-110).
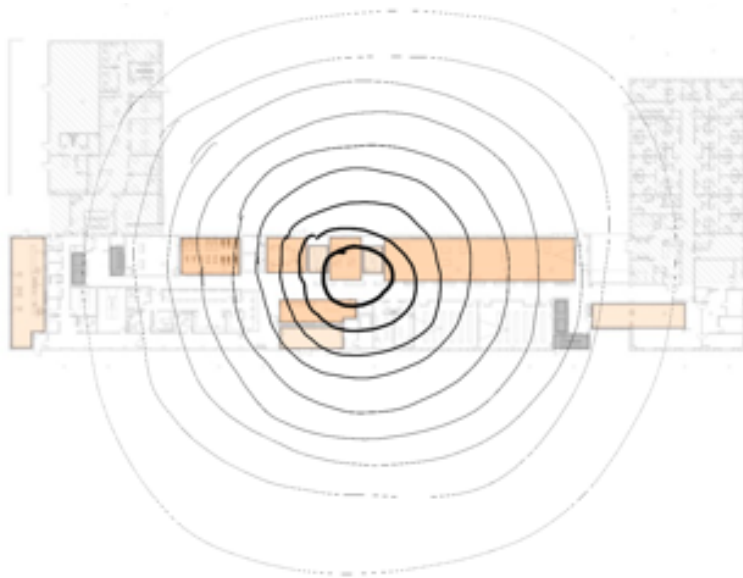
Figure 48: Pattern 07: Central Commons.

Design Suggestion:

Major residence hall common spaces should be placed adjacent to each other on a major floor, located centrally, and proximate to a main building entrance.

Performance Criteria:

Building commons should function as central places where students can sit and eat, socialize, and do schoolwork while watching people go by. These spaces should be located centrally, on a major floor, and proximate to a main building entrance. These types of spaces encourage informal interactions and promote the growth of community in a residence hall building.

Questions:

• Are the primary building common spaces of the residence hall centrally located?

• Are they on a main floor?

• Are the primary building commons located near a main building entrance?

Related Patterns:

Pattern 04: Hallways as Social Spaces (pages 167-168)

Pattern 05: A Variety of Lounges (pages 169-170)

Pattern 06: Social Adjacencies (pages 171-172)

Pattern 08: Terraces that Connect (pages 175-176)

6.1.2.2. Pattern 08: Terraces That Connect

Findings:

This study's analyses reveal that a residence hall terrace has the potential to function as a major social space and can function to connect students with a residence halls' surrounding setting. Terraces can function to connect indoor spaces to the outdoors which can help to improve students' nature valuations. Perceived connections with nature of this sort can play a significant role in the development of a strong ecological identity (pages 110-117).
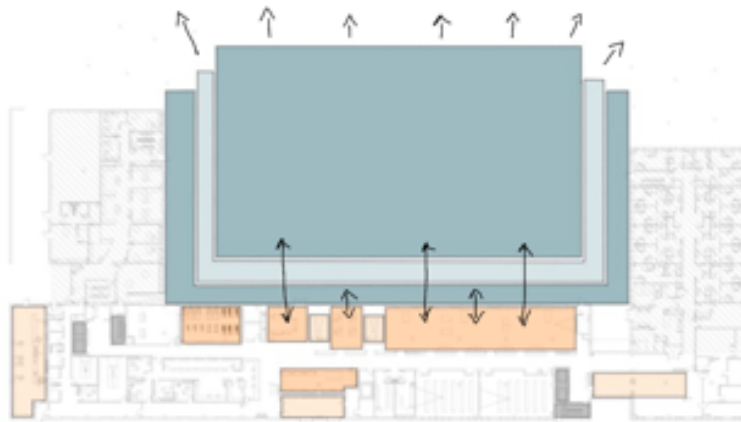
Figure 49: Pattern 08: Terraces That Connect.

Design Suggestion:

Design a residence hall terrace that is located next to major interior commons spaces and which includes as much greenery as possible. This terrace should offer perceived connections to any surrounding natural environment.

Performance Criteria:

A residence hall terrace should function as a space that connects indoor social spaces with the outdoor environment. It should be a place where students can sit and eat, socialize, play, or do schoolwork. It should be located centrally, visible from a variety of building spaces, adjacent to a major building common space, and include, as much as possible, plants and greenery.

Terraces can improve students' perceived connections with their local natural settings which, in turn, improves their nature valuations which aids in defining their ecological identity.

Questions:

• Is the terrace adjacent to major building common spaces?

• Is the terrace visible from a variety of places throughout the residence hall building?

• Is the terrace green?

Related Patterns:

Pattern 06: Social Adjacencies (pages 171-172)

Pattern 07: Central Commons (pages 173-174)

Pattern 09: Neighborhood Connections (pages 177-178)

Pattern 17: Ecological Reminders (pages 198-199)

6.1.3. Design Strategies: Community — Residence Hall Neighborhood

6.1.3.1. Pattern 09: Neighborhood Connections

Findings:

Analyses of this study's data suggest that students' sense of neighborhood community is linked to the growth of their ecological identity and is affected by their residence hall's location within the city. Students who live in residence halls that are located off of campus feel a greater connection to their local neighborhoods as well as a greater connection with any local nature (pages 120-126).

Figure 50: Pattern 09: Neighborhood Connections.

Design Suggestion:

Place residence halls off of campus, within an active neighborhood, and near a lively commercial zone.

Performance Criteria:

Student's need to feel connected to their local neighborhood in order to improve their sense of social connections.

A residence hall should be located off of campus and near both a socially vibrant urban district and an urban green space. There should be no perceptible boundaries between the residence hall and the vibrant district or the green space (for example: a high-traffic bridge). Students who connect to their local neighborhood experience more opportunities for community-related ecological behavioral-learning and tend feel a greater sense of ecological responsibility.

Questions:

• Are there a variety of neighborhood amenities within a 20 minute walk of the residence hall?

• Is there a friendly green space within a 10 minutes walk?

• Are there any boundaries between the residence hall and the neighborhood district?

Related Patterns:

Pattern 06: Social Adjacencies (pages 171-172)

Pattern 10: Large Refrigerators (pages 179-180)

Pattern 17: Ecological Reminders (pages 198-199)

6.1.3.2. Pattern 10: Large Refrigerators

Findings:

Analyses revealed that students who have easy access to kitchens experience stronger positive connections to neighborhood community. Mapping data suggests that grocery shopping lends to students venturing further out into their local neighborhood, and through this, connecting more strongly with their local neighborhood. Neighborhood connections offer students more opportunities for community-related ecological behavioral-learning (pages 126-129).

Figure 51: Pattern 10: Large Refrigerators.

Design Suggestion:

Assuming all residence hall students have easy access to a kitchen (*Pattern 03*), make sure that there is a large refrigerator in every suite for the storage of groceries.

Performance Criteria:

Students should to connect to their local neighborhood community and grocery shopping helps students venture out into their neighborhoods.

Offering each student access to a large refrigerator encourages grocery shopping, which helps to get students out and into their local neighborhood. Student residents who connect with their local neighborhood community show a measured increased in their sense of ecological identity.

Questions:

• Is there a large refrigerator in each residence hall suite?

• Is there a grocery store within a 20 minute walk of the residence hall?

Related Patterns:

Pattern 03: Kitchens as Community Centers (pages 165-166)

Pattern 09: Neighborhood Connections (pages 177-178)

Pattern 14: Kitchen Storage (pages 189-190)

Pattern 17: Ecological Reminders (pages 198-199)

6.2. Design Strategies: Place

Sustainable Design Patterns

Education

Community

Pattern 16: Place Appropriate Signs
Pattern 17: Ecological Reminders

Pattern 01: Privacy Gradients
Pattern 02: Suite Commons
Pattern 03: Kitchen Community Centers
Pattern 04: Hallways as Social Spaces
Pattern 15: Eco-Communicative Lights   Pattern 05: A Variety of Lounges
Pattern 06: Social Adjacencies
Pattern 07: Central Commons
Pattern 08: Terraces That Connect
Pattern 09: Neighborhood Connections
Pattern 10: Large Refrigerators

Behavior

Pattern 11: A Friendly Trash Room
Pattern 12: A Central Trash Room
Pattern 13: Three-Step Floor Recycling
Pattern 14: Kitchen Storage

Place

Figure 52: Sustainable Design Patterns — Place.

The physical landscape of a residence hall has the potential to affect student residents'

ecological behaviors in a couple of ways. First, aspects of the built environment control

perspectives about how easy or accessible an ecologically responsible action will be. Action

possibilities that are either not perceived as easy or are not made apparent by the built

landscape are less likely to be acted upon than behavioral choices that are recognized as easy

and/or are made visibly obvious. The physical landscape of a residence hall also has a

normative influence on residents' behaviors. If the actions of others are visible, this supplies

injunctive normative influence on behavior. The condition of the built environment — clean and

organized versus dirty and disordered — supplies descriptive normative influence on behavior. The built landscape can make certain actions more or less visible, can integrate certain processes into the daily spaces of residence hall students, and can help to define what conditions are considered normal. In the Ecological Behavioral Framework these influences are expressed through the elements Subjective and Personal Norms, and Perceived Behavioral Controls.

This study's analysis has shown that variations in the built landscapes of these residence halls can and do contribute to differing behavioral outcomes through injunctive and descriptive normative influence and by affecting perceptions of access and ease. A built landscape that supports ecologically responsible behaviors can potentially have a powerful influence on the formation of a students' ecological identity.

The following five Patterns address moments in the residence halls' built landscapes where the physical setting affects students' sustainable behaviors and ecological behavioral-learning. Patterns 11-13 deal with the process of recycling. Pattern 14 addresses an effect that kitchen storage has on students' behaviors relating to waste. And Pattern 15 describes a relationship between lighting settings and controls, and students' behaviors relating to energy use.

6.2.1. Design Strategies: Place — Recycling and Waste

6.2.1.1. Pattern 11: A Friendly Trash Room

Findings:

Analysis of this study's data reveals that a common issue connected to poor recycling habits is a poorly maintained trash room. Students repeatedly referenced smelly, gross, and overflowing conditions as a primary reason that they don't put much effort into recycling — even though all of the students in this study believe they ought to recycle. A trash room that is spacious, well lit, well ventilated, and easy to maintain could alleviate some of the negative behavioral influences exemplified by these residence halls' trash room conditions (pages 135-136).
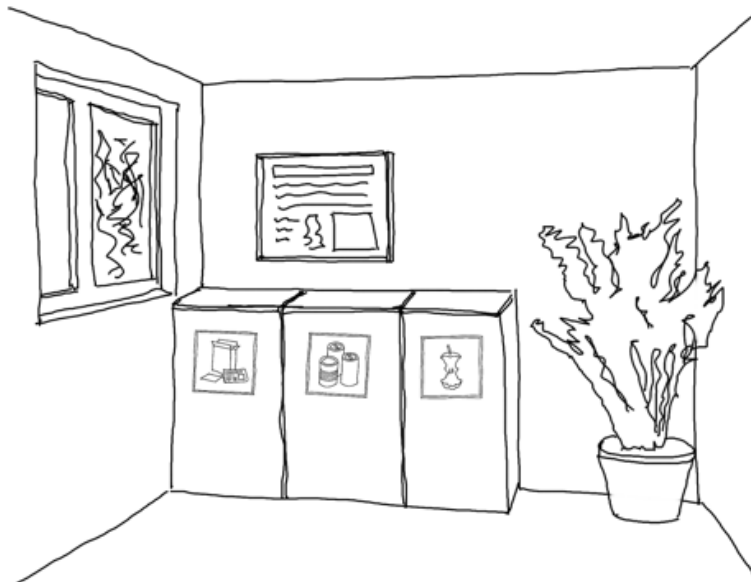
Figure 53: Pattern 11: A Friendly Trash Room.

Design Suggestion:

Design a spacious and well-lit trash room that is easy to organize and keep clean.

Performance Criteria:

Students need to experience a trash room that does not discourage them from putting time and effort into recycling.

Dirty and smelly trash room conditions create negative descriptive norms and communicate to the residence hall students that the process of dealing with waste and recycling is unpleasant and that disorganized and overflowing conditions are normal. This in turn encourages the students to spend as little time and effort as possible dealing with their recycling. A trash room that is easy to keep clean and organized, and is well lit and ventilated, can help to encourage diligent recycling behaviors.

Questions:

• Is the trash room well lit and well ventilated?

• Is the trash room easy to keep clean?

• Is the trash room large enough to accommodate a variety of containers?

Related Patterns:

Pattern 12: A Central Trash Room (pages 185-186)

Pattern 13: 3-Step Recycling on Each Floor (pages 187-188)

Pattern 16: Place Appropriate Signs (pages 195-197)

Pattern 17: Ecological Reminders (pages 198-199)

6.2.1.2. Pattern 12: A Central Trash Room

Findings:

Analysis of the study's data reveals that trash rooms that are placed in out-of-the-way locations and off of major circulation pathways discourage rigorous recycling habits; while trash rooms that are centrally located are linked to improved students recycling behaviors (pages 137-139).
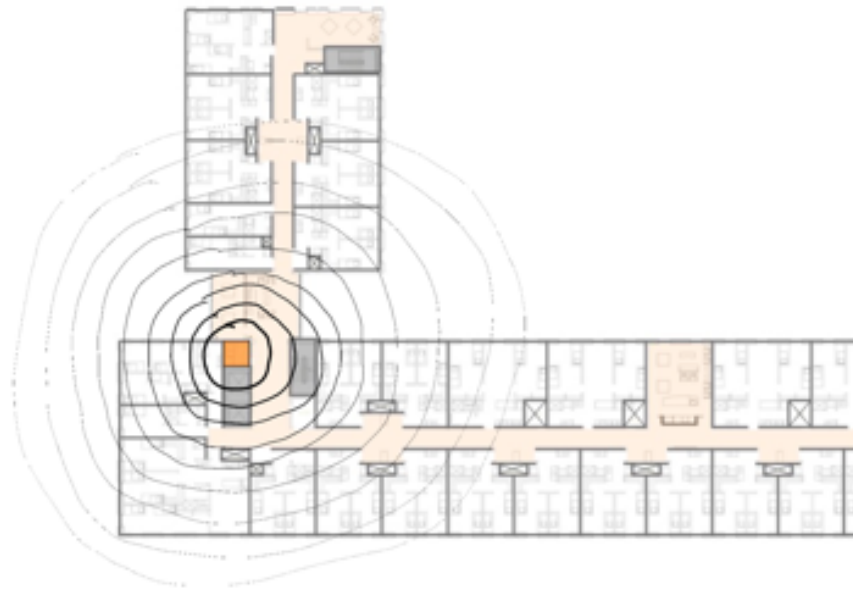
Figure 54: Pattern 12: A Central Trash Room.

Design Suggestion:

Place the trash room on each residence hall floor in a central location adjacent to the floor's major pathways and common social spaces in order to make the process of recycling easier.[205]

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[205] To illustrate how significant an effect the location of recycling can have; a study done in the early 80s that introduced more conveniently located recycling containers in three different apartment complexes increased the recycling of newspapers from a baseline of 50% to 100%. Improving the location of a step in an ecological behavioral process such as recycling can improve both injunctive and descriptive normative influence on ecologically responsible behaviors by making them both easy and socially visible. As Mckenzie-Mohr states in *Fostering Sustainable Behavior:* "In short, you want to design a program that enhances motivation by making the sustainable behavior more convenient."
P. Luyben and S. Cummings, "Motivating beverage container recycling on a college campus," *Journal of Environmental Systems*, 11 (1981-82): 235-245; Mckenzie-Mohr, *Fostering Sustainable Behavior,* 124.

Performance Criteria:

Students need easy access to a clean trash room in order to encourage rigorous recycling behaviors.

Poorly design trash rooms can function as obstacle to students who want to behave in an ecologically responsible way. Trash rooms should be well labeled, centrally located, and adjacent to a residence hall floors' main hallway.

Questions:

• Is the trash room centrally located on each residence hall floor?

• Is the trash room easy access?

• Is the trash room door visible from some of the common lounges?

Related Patterns:

Pattern 11: A Friendly Trash Room (pages 183-184)

Pattern 13: 3-Step Recycling on Each Floor (pages 187-188)

Pattern 16: Place Appropriate Signs (pages 195-197)

Pattern 17: Ecological Reminders (pages 198-199)

6.2.1.3. Pattern 13: Three-Step Floor Recycling

Findings:

A major issue revealed in the focus group discussion with one of the residence hall groups demonstrated that adding a step in the trash/recycling process between a suite and a residence hall floor's trash room confuses and disperses responsibility; none of the students are clearly accountable for moving trash and recycling from a shared floor location to the trash room. This creates a place where trash to piles up; which supplies a negative normative influence on students' recycling behaviors.

Also there were many complaints, from all of the residence hall groups, that students are not supplied with individual recycling containers within each of their rooms. Offering each student a small individual recycling container could allow them a behavioral option, if their suite recycling habits are an issue (pages 139-141).

Figure 55: Pattern 13: 3-Step Floor Recycling.

Design Suggestion:

Design a three-step recycling process into the built landscape of each residence hall floor. Make sure that there is space within each residence hall room for a small, individual recycling

container. Design a space, preferably near the suite door, for general suite garbage and recycling. And, finally, do not design a space for trash and recycling in a location between the students' suites and the trash room.

Performance Criteria:

It is common for students to feel that if someone in their suite messes up the recycling it defeats all of their efforts. One student in the focus groups described how she brought in her own recycling container so she can avoid the suite recycling issues entirely by taking her individual recycling directly to the trash room. Supplying each student with an individual recycling container would create a situation where a sense of responsibility is not dispersed by others' mistakes.

Students need easy access to individual recycling but should not be able to leave trash or recycling anywhere where responsibility for bringing it to the trash room is dispersed beyond a their suite-mates.

Questions:

• Does each residents have a space for and individual trash and recycling can?

• Is there space near the door of each suite for a recycling container and a trash can?

• Is there somewhere between suite and trash room to leave trash and recycling? (of so, change your design!)

Related Patterns:

Pattern 11: A Friendly Trash Room (pages 183-184)

Pattern 13: 3-Step Recycling on Each Floor (pages 187-188)

Pattern 16: Place Appropriate Signs (pages 195-197)

Pattern 17: Ecological Reminders (pages 198-199)

6.2.1.4. Pattern 14: Kitchen Storage

Findings:

Data analysis showed that students who have access to kitchen storage produce less waste. Kitchen cupboards allow students the space and storage to support ecologically sound behavioral choices relating to waste and consumption habits.

Students who do not have access to enough kitchen-related storage tend to resort to the use of disposable eating-ware. Though they know that this is not ecologically sound behavior, it is easier than finding storage for eating-ware within the limited space of their private rooms. On the other hand, students who live in suites that do have cupboard space (see Pattern 10: Large Refrigerators) did not mention using disposables. These students have enough storage for food and eating-related stuffs that they don't have to resort to habits that run counter to their positive ecological awarenesses (pages 141-144).

Figure 56: Pattern 14: Kitchen Storage.

Design Suggestion:

Design residence hall suites so that each resident has access to storage for cooking/eating related stuffs, as well as easy access to a sink to wash them in.

Performance Criteria:

Students need storage space for food and cooking/eating related stuffs. Students who do not have room for this kind of storage find their options limited and often act in ways that do not necessarily align with their ecological values. Kitchen cupboards and a refrigerator allow students the space and storage to support ecologically sound behavioral choices relating to waste and consumption habits.

Questions:

• Does each residents have space to store cooking/eating related stuffs?

• Does each students have easy access to a sink where they can clean cooking/eating related accoutrements?

Related Patterns:

Pattern 03: Kitchens as Community Centers (pages 165-166)

Pattern 10: Large Refrigerators (pages 179-180)

Pattern 13: 3-Step Recycling on Each Floor (pages 187-188)

6.2.2. Design Strategies: Place — Energy

6.2.2.1. Pattern 15: Eco-Communicative Lights

Findings:

Analysis of this study's data revealed that automatic lighting systems can be thought about as a means of communicating ecologically descriptive norms. Students who live on residence hall floors where the lighting in common areas either reacts to use or is set on schedules that recognizes high-use and low-use times, learn that lights-off is a normal environmental condition. These students learn to recognize that lighting is a changeable and controllable element of their landscapes (pages 144-146).
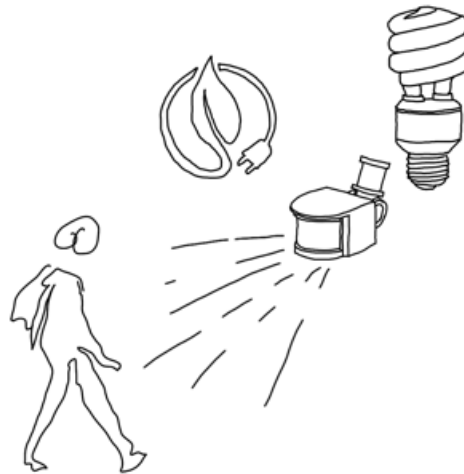
Figure 57: Pattern 15: Eco-Communicative Lights.

Design Suggestion:

In any residence hall common space, lighting should be controllable and the default setting should react to use. This should apply to any common spaces whether naturally lit during the day or not. Lights should either be set on schedules that adjust to a space's high and low use times, or set on motion sensors to turn on only when a space is being used.

All lights in student occupied spaces should also somehow communicate through signs or symbols that they are energy efficient; again as a normative reminder that lighting and related

energy use habits are relevant to students' daily ecological responsibility. If there are lights on a residence hall floor that are left on for large portions of the day, lights that are known to be energy efficient will at least define a norm in which care is taken.

Performance Criteria:

Students should be able to control lighting in any common spaces on the residence hall floors, and the default settings should default to 'off' when a space is not in use.

Lighting can be thought about as a means of communicating ecologically descriptive norms. If lighting is not controllable, it should at least react to space use. This creates a normal condition where lights are off (or at least set at low) when a space is not in use. Also, energy efficient aspects of lighting should be communicated through signs or symbols as a normative reminder that energy use habits are directly related to ecological responsibility.

Questions:

• In the common areas on each residence hall floor is the lighting controllable?

• If any lighting is not controllable, does it react to space use?

• When a room is unused, are the lights off or on a low setting?

• Are there signs that communicate that the common room lights are energy efficient?

Related Patterns:

Pattern 16: Place Appropriate Signs (pages 195-197)

Pattern 17: Ecological Reminders (pages 198-199)

6.3. Design Strategies: Education

Figure 58: Sustainable Design Patterns — Education.

Education has been shown to be essential to the development of sustainable attitudes. People learn best when they know how to get something done; are supplied with the place-specific knowledge and understanding that will support ecological attitudes and values that are shared by a community.[206] Ecological learning has been linked with a willingness to act which is an essential component of the Attitude Toward Behavior variable of the Ecological Behavioral Framework. This learning is based on a foundation of ecological knowledge and understanding

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[206] Jagers, "In Search of the Ecological Citizen," 27, 32.

that are reflected in the Ascription of Responsibility, and Awareness of Consequences elements of the Framework.[207]

There are a number of issues that students expressed repeatedly in this study's focus groups that relate to moments in their daily lives where they do not act ecologically due to a lack of knowledge and/or awareness. These issues can be delineated into two types of conditions where situated knowledge and place-specific understanding is lacking and lends to the residence hall residents not acting in ecologically responsible ways. First, there are moments in the daily lives of the students where they are simply unsure what actions are ecologically correct. This issue relates to the Attitude Toward Behavior variable of the Ecological Behavioral Framework. Second, there are times in their daily lives where the residence hall residents tend to forget that their actions have larger ecological consequences. In the Ecological Behavioral Framework these influences are expressed through the elements Ascription of Responsibility, and Awareness of Consequences.

The last two Patterns in this Chapter address these two kinds of moments. Pattern 16 confronts an instance in the daily lives of the residence hall students where their ecologically positive behaviors could be supported by place-specific knowledge. Pattern 17 describes how the built environment of the residence halls could function to remind students of their ecological responsibilities.

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[207] Stern et al., "Values, Beliefs, and Proenvironmental Action," 1614; Jagers, "In Search of the Ecological Citizen," 18, 32.

6.3.1.1. Pattern 16: Place Appropriate Signs

Findings:

Analysis of this study's data revealed a number of moments in the built landscapes of the residence halls where a lack of situated knowledge lends to the residence hall residents being unable to act in ecologically positive ways. Students in the focus groups often sited moments in their daily lives where they try to recycle but either fail or give up trying because they are unsure what action is correct. This is an instance in the daily lives of the residence hall residents where specific information, communicated in immediate proximity to the place where recycling happens could help students ensure that their behavior is correct and engender a stronger sense of ecological efficacy[208] (page 149).
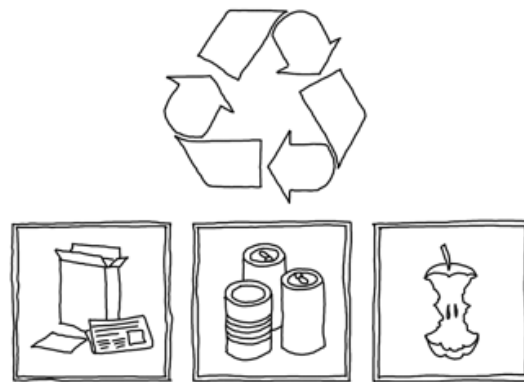
Figure 59: Pattern 16: Place Appropriate Signs.

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[208] As Mckenzie-Mohr describes in *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing,* signage that is noticeable, self-explanatory, time and place appropriate, and prompts positive activities can have a significant effect on ecological behavioral outcomes. He cites a study in a hotel that demonstrated that a sign which communicates a room-specific descriptive norm, instead of a standard informational sign, increased towel reuse from 37% to 49%. Signage that is simple, vivid, clear, and concrete; whether text or graphics, works best.
Doug Mckenzie-Mohr, *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing*, 3rd edition (Gabriela Island, BC: New Society Publishers, 2011), 67, 95.

Design Suggestion:

Create moments in the built landscape of a residence hall where place-appropriate signage can help guide students to act ecologically.[209]

Performance Criteria:

Students often need information at specific moments of behavioral choice. Signage that is immediately proximate to these locations can help guide students when they are unsure what specific actions are ecologically correct. Information, communicated at these moments in the daily lives of the residence hall residents, can help engender a sense of ecological efficacy.

Questions:

• Are there moments where place-appropriate information could help students to act in an ecologically correct way?

Related Patterns:

Pattern 11: A Friendly Trash Room (pages 183-184)

Pattern 15: Eco-Communicative Lights (pages 191-192)

Pattern 17: Ecological Reminders (pages 198-199)

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[209] A place for signage related to the rules of recycling immediately outside of the residence hall trash rooms is one example. Another example that relates to *Pattern 15* is a place for signage adjacent to the lighting controls for floor commons areas, which potentially could communicate both control mechanisms as well as highlight the energy efficient aspects of the lighting design, which can help to effect normative influence.

6.3.1.2. Pattern 17: Ecological Reminders

Findings:

Analysis of the study's data revealed a number of moments in the built landscapes of the residence halls where students tend to forget that their actions have larger ecological consequences and often act in non-ecologically positive ways (pages 149-150).

One possible approach to this issue is addressed in a number of sustainability dialogues; offer moments within a design where there are views of nature, or at least nature-like settings. This functions to remind people that there is a larger natural context to their actions.[210] A second approach, to be used especially in spaces where direct exterior views are not possible, is to offer symbolic representations of nature. Whether this happens via artwork, plantings, installations, or biophilic patterning in the built landscape; studies have shown that these cues can illicit the same effect as actual views of nature.[211] Both of these approaches can produce an innate affinity with nature and can function as reminders that highlight an awareness of ecological consequences and a sense of responsibility to act in an ecologically responsible way[212].

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[210] LEED speaks to this in the credit: Quality Views. Biophilic design discourses suggest that natural views improve healing and support social health, which lowers stress and improves concentration, all of which connects to an improved sense of place and positive valuations of nature. This study stresses that views of nature can function to remind students of their ecological value priorities at moments in their daily landscapes that could affect an ecological behavioral choice.
U.S. Green Building Council, *LEED v4 for building Design and Construction, updated July 8, 2017,* (https://www.usgbc.org/resources/leed-v4-building-design-and-construction-current-version), 135; Kellert, "Dimentions, Elements, and Attributes of Biophiloic Design," 4.

[211] Hartag, Bringslimark, and Grindal Patil, "Restorative Environmental Design," 133; Alex Wilson, "Biophilia in Practice: Buildings That Connect People with Nature," in *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, ed by Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador (Hoboken NJ: John Wiley & Sons, Inc., 2008), 330.

[212] Hartag, Bringslimark, and Grindal Patil, "Restorative Environmental Design," 133; Nikos A. Salingaros and Kenneth G. Masden II., "Neuroscience, the Natural Environment, and Building Design," in *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, ed by Kellert, Stephen R., Judith H. Heerwagen, and Martin L. Mador (Hoboken NJ: John Wiley & Sons, Inc., 2008) 59-84.
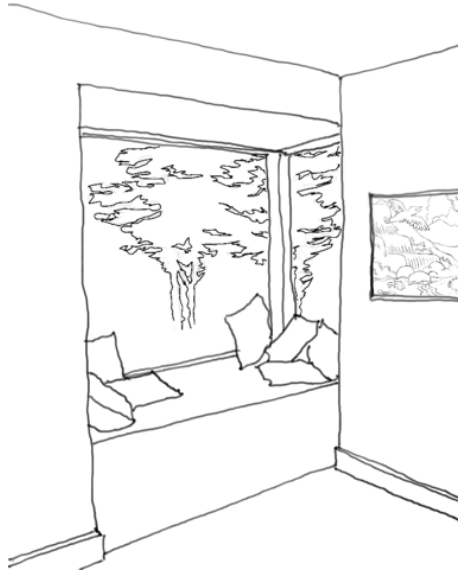
Figure 60: Pattern 17: Ecological Reminders.

Design Suggestion:

Include in the design of the daily built landscape of a residence hall experiential moments that can function to remind students of their ecological responsibilities. Place these moments proximate to places where ecological behavioral choices are made.

Performance Criteria:

Students need to be offered ecological cues at moments where they have a choice to act ecologically.

These cues can be moments within a design where there are views of nature or symbolic representations of nature. These experiences can produce an innate affinity with nature and function as a reminder that highlights an awareness of ecological consequences and a sense of responsibility to act in an ecologically responsible way. For example, design a trash room with a view of trees to encourage recycling; or design a bathroom with a view of a river to encourage responsible water use. These cues can come in a variety of forms, but need to be placed at moments where ecological behavioral choices are made.

Questions:

• Are there moments in the built landscape of the residence hall where ecological cues could remind students to act ecologically?

Related Patterns:

Pattern 08: Terraces That Connect (pages 175-176)

Pattern 12: A Central Trash Room (pages 185-186)

Pattern 15: Eco-Communicative Lights (pages 191-192)

Pattern 16: Place Appropriate Signs (pages 195-197)

6.4. Design Strategies: Conclusions

As stated in the introduction to this dissertation, this study hopes to illuminate a built landscape's potential agency in the growth of an ecologically sound culture by examining the subtle and complex relationships that exist between shifting ecological identities and daily built environments.

This study has three objectives. First, this dissertation adds to the ever-growing sustainability dialogues in the field of architecture by espousing a specific eco-social approach to sustainability founded on behavioral theories. By rationalizing and operationalizing a specific Ecological Behavioral Framework in Chapter 2, this study shows that environmentally significant behaviors and ecological learning can theoretically correlate to specific elements of a built landscape. This theoretical framework can be used to explore the mechanisms that relate ecologically significant behaviors with the built landscapes within which they are learned and performed.

Second, Chapters 3 and 4 of this study define and demonstrate a methodology that uses the Ecological Behavioral Framework to expose moments in the design of university residence halls where the built environment can directly or indirectly play a role in the learning of sustainable behaviors and the growth of students' ecological identification.

Finally, this dissertation produces useful outcomes in order to illustrate the value of a behavioral design approach to architectural sustainability. Chapter 6 is a series of simple, sustainable design ideas in the form of architectural patterns. These sustainable spatial design patterns help to define built environment moments that can support ecological behavioral-learning and help to sustain ecologically responsible behaviors in residence hall students: and these design patterns stemmed directly from the findings discussed in-depth in Chapter 4. By framing a behavioral approach to sustainability and demonstrating that its application can

produce useful outcomes in the form of architectural design patterns, this dissertation

illustrates the potential value of a behavioral design approach to architectural sustainability.

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Patterns in Daily Life: Readdressing Residence Hall Design

<u>**PLEASE READ AND CONTINUE ON TO SURVEY:**</u>

University of Wisconsin – Milwaukee
Consent to Participate in Online Survey Research

Study Title: Patterns in Daily Life: Readdressing Residence Hall Design

Person Responsible for Research: Sarah Keogh, PhD Candidate (Advisor: Josef Stagg)

Study Description: The purpose of this research study is to explore the relationship between specific residence hall design elements and daily behavior patterns of residence hall residents. Approximately 3500 subjects will participate in this study. If you agree to participate, you will be asked to complete an online survey that will take approximately 25 minutes to complete. The questions will ask you about your daily life as a residence hall resident as well as a few questions about your general worldview. All of the questions except for one offer easy multiple choice or scale answers.

Risks / Benefits: Risks to participants are considered minimal. Collection of data and survey responses using the internet involves the same risks that a person would encounter in everyday use of the internet, such as breach of confidentiality. While the researchers have taken every reasonable step to protect your confidentiality, there is always the possibility of interception or hacking of the data by third parties that is not under the control of the research team.

There will be no costs for participating. Though there will be no immediate benefits for participating, this research will potentially help to improve daily life in UW's residence halls as well as lead to the improvement of future residence hall designs.

The data collected for this survey will be anonymous. Identifying information such as your name, email address, and the Internet Protocol (IP) address of this computer will not be asked or available to the researchers. Data will be retained on the UWM - Qualtrics website server through the spring semester of 2018 and will be deleted by the research staff after this time. However, data may exist on backups or server logs beyond the timeframe of this research project. Data transferred from the survey site will be saved on a password protected computer for through the spring semester of 2018.   Only the student primary researcher, Sarah Keogh, will have access to the data collected by this study. However, the Institutional Review Board at UW-Milwaukee or appropriate federal agencies like the Office for Human Research Protections may review this study's records.

Voluntary Participation: Your participation in this study is voluntary. You may choose to not answer any of the questions or withdraw from this study at any time without penalty. Your decision will not change any present or future relationship with the University of Wisconsin Milwaukee.

Who do I contact for questions about the study: For more information about the study or study procedures, contact Sarah Keogh at <u>shkeogh@uwm.edu</u>.

Who do I contact for questions about my rights or complaints towards my treatment as a research subject? Contact the UWM IRB at 414-229-3173 or <u>irbinfo@uwm.edu</u>

Research Subject's Consent to Participate in Research:

By entering this survey, you are indicating that you have read the consent form, you are age 18 or older and that you voluntarily agree to participate in this research study.

Thank you!

Continue

1. Is your current residence hall the first place you have lived as an adult?

    yes / no

2. Is this your first year living in a Residence Hall?

    yes / no

3. How old are you?

    [entry]

4. Which year in school are you?

    freshman / sophomore / junior / senior / graduate

5. How do you identify yourself?

    male / female / transgender / prefer not to answer

6. Where are you from?

    Wisconsin / elsewhere in the Midwest / elsewhere in the US / International

7. Which Residence Hall do you live in?

    Cambridge Commons / Riverview Commons / Sandburg East / Sandburg West / Sandburg North / Sandburg South

8. Including yourself, how many people live in your residence hall suite? Or, if you do not live in a suite, how many people live in your residence hall room?

    1 / 2 / 3 / 4 / 5 / 6 / 7 / 8+

9. Is your Residence Hall LEED certified?

    yes / no / don't know

10. Are you a part of a Residence Hall LLC?

    yes / no

11. Were you were able to choose which Residence Hall you wanted to live in? and if so, which factors played an important role in your choice? (please check all that apply)

    yes, location / yes, privacy / yes, more space / yes, building amenities / yes, LEED certification / yes, LLC or other like program / yes, other reasons / no, I didn't choose

12. Do you consider the students on your residence hall floor a community?

    yes, a close-knit community / yes, but only in some ways / no, not really

13. Do you consider the students in your residence hall building a community?

    yes, a close-knit community / yes, but only in some ways / no, not really

14. Do you consider the students on your campus a community?

    yes, a close-knit community / yes, but only in some ways / no, not really

15. Does your campus promote sustainable living?

    yes / yes, but not enough / no / don't know

16. Was your choice of university influenced by sustainable programs?

    yes / no

17. Did you grow up in an ecologically conscious household?

yes / no

18. Choose up to three 'green' behaviors that you think are important to incorporate into your daily life…

recycling / energy conservation / water conservation / support local business / buy organic/free-range / minimize private car use / other[entry]

19. How often do you shower in a normal school week?

daily / every other day / a few times a week / weekly / rarely

20. How long is your average shower?

1 to 3 minutes / 4 to 6 minutes / 7 to 9 minutes / 10 or more minutes

21. Do you ever wash up at a sink instead of taking a shower?

frequently / occasionally / rarely / never

22. Do you feel its ok to take a longer shower because you live in a residence hall with good water efficiency?

yes / no

23. Do you always flush when you pee?

yes / sometimes / no

24. Did you pay attention to your water use in the household you grew up in?

always / most of the time / sometimes / rarely / never

25. Are you careful about turning off appliances and electronics when they are not in use?

always / most of the time / sometimes / rarely / never

26. Do you feel that its ok to leave lights on if they are energy efficient lights?

yes / no

27. Did you pay attention to your energy use in the household you grew up in?

always / most of the time / sometimes / rarely / never

28. How careful are you about recycling your trash?

I always recycle / I usually recycle / I sometimes recycle / I rarely recycle / I never recycle

29. Do you have a recycling container in your room / suite?

yes / no, but there's one on my floor / no, but there's one in the building / no, there is no accessible recycling container

30. Are you aware of how careful other students in your residence hall are about recycling?

very aware / mostly aware / somewhat aware / slightly aware / not aware

31. Did you recycle in the household you grew up in?

always / most of the time / sometimes / rarely / never

32. Do you have a reusable shopping bag?

yes / no

33. Do you have access to a kitchenette?

yes, in my room/suite / yes, on my floor / yes, in the building / no

34. How often do you cook for yourself in your residence hall kitchenette?

   frequently / occasionally / rarely / never

35. What factors encourage you to use the kitchenette? (please check all that apply)

   its easy / its fast / I can control what I eat / its social / its private / I enjoy cooking / I don't use the kitchenette

36. What factors discourage you from using the kitchenette? (please check all that apply)

   its small / lack of kitchen equipment / lack of dishes/pots/utensils / its dirty / location / its not private / there are no discouraging factors

37. How often do you eat at a residence hall cafeteria in a normal school week?

   every meal / most meals / half of my meals / a few meals a week / rarely / never

38. How many times a week do you eat at the university Union in a normal school week?

   every meal / most meals / half of my meals / a few meals a week / rarely / never

39. How often do you bring fast food / pizza to your residence hall in a normal school week?

   frequently / occasionally / rarely / never

40. How important is it to you to buy organic and/or free-range food?

   very important / somewhat important / not important

41. Do you think its important to buy local?

   very important / somewhat important / not important

42. Do you know where the closest local farmers market happens?

   yes / no

43. When you get coffee or tea to go at a shop how often do you use your own travel mug?

   usually / occasionally / rarely / never

44. Do you have storage for dishes in your residence hall room / suite?

   yes / yes, but not enough / no

45. Would adding storage to your residence hall room / suite help you to create less waste?

   yes / no

46. Where in your residence hall room / suite would you like to have more storage? (please check all that apply)

   bedroom / common room / kitchenette / entry / bathroom / no need

47. What kind of local shops do you frequent? (please check all that apply)

   restaurants / coffee shops / grocery stores / clothing/shoe stores / office/art supply / barber/beauty salons / furniture/home goods stores / pharmacies / hardware / resale stores / electronic/phone store / bank / bike shop / fitness center / other

48. How often do you shop at a resale shop?

   its the first place I go when I need something I will likely find there / I go once and awhile / rarely / never

49. Are you careful to shop for items that contain recycled content?

   very careful / mostly careful / somewhat careful / slightly careful / not careful

50. Approximately how much stuff for daily living did you buy for your residence hall room / suite when you moved in? (includes towels, furniture, chairs, shelving, microwave, hot plate, bedding, shower equipment, etc…)

$0 - $100 / $100 - $200 / $200 - $400 / $400 - $600 / more than $600

51. Did you buy any of this stuff used?

most of it / some of it / a bit of it / none of it

52. How many of these items will you no longer need once you move out of the residence hall? (please check all that apply)

towels // bathroom storage/containers/carriers // bedroom storage/closet storage // bedding // dishes/ flatware // food containers // pots/pans/cooking utensils // cooking/heating equipment // desk/work storage // lamps // chairs/futons/seating // other… [each - keep / might keep / won't keep]

53. Is it easy for you to go grocery shopping?

yes, I can walk / yes, if I drive / yes, if I bike or use public transportation / no

54. Is there a comfortable public bus stop near your residence hall?

yes, very close / within a few minutes walk / no

55. How often do you use public transportation? (other than a school shuttle)

almost daily / a couple times a week / once and awhile / never

56. Do you store a bike at your residence hall?

yes / no

57. Is it easy to store a bike at your residence hall?

yes, very easy / sort of easy / not easy / I don't store a bike

58. Do you use the Bubbler program? (or any free bike program?)

yes, regularly / once and awhile / rarely / never

59. How often do you bike?

regularly / once and awhile / rarely / never

60. Do you have a car at your residence hall?

yes / no

61. How often do you drive?

regularly / once and awhile / rarely / never

62. Is it easy to keep a car at your residence hall?

yes, very easy / sort of easy / not easy / I don't keep a car

63. How close is a comfortable public bus stop?

within 1 minute / 1-2 minutes / 2-5 minutes / 5-10 minutes / more than 10 minutes away

64. How often do you study at a local coffee shop or public library? (not on campus)

daily / every other day / a few times a week / weekly / rarely

65. How close is the nearest Goodwill or resale shop?

within 5 minutes / 5-10 minutes / 10-20 minutes / 20-30 minutes / more than 30 minutes away / I don't know

66. How close is your favorite grocery store?

    within 5 minutes / 5-10 minutes / 10-20 minutes / 20-30 minutes / more than 30 minutes away / I don't know

67. How close is the nearest pharmacy?

    within 5 minutes / 5-10 minutes / 10-20 minutes / 20-30 minutes / more than 30 minutes away / I don't know

68. How often do you eat at a local restaurant? (excluding chain fast food)

    daily / every other day / a few times a week / weekly / rarely

69. How close is the nearest farmer's market?

    within 5 minutes / 5-10 minutes / 10-20 minutes / 20-30 minutes / more than 30 minutes away / I don't know

70. To what extant do you consider yourself a part of your local neighborhood community?

    I'm an active member of the community / I feel ties to the community, but am not an active member / I am not a member of the local community

71. In the warmer months of the school year, how often do you enjoy 'nature' within the city (walking trails, bike paths, green spaces by the river or lakeshore)?

    daily / every other day / a few times a week / weekly / rarely

72. Are there any sustainable habits that you would like to incorporate into your daily life at the residence hall that you find difficult to actuate? What are they? What would help?

    [open entry]

73. What degree of moral obligation do you feel with regard to separating recycling from the rest of the trash in your daily life at the residence hall?

    very obligated / somewhat obligated / a bit obligated / not very obligated / not obligated

74. What degree of moral obligation do you feel with regard to separating recycling from the rest of you trash outside of the residence hall?

    very obligated / somewhat obligated / a bit obligated / not very obligated / not obligated

75. It would be morally incorrect for me NOT to separate recycling from the rest of the trash.

    strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

76. If I DID NOT separate recycling from the rest of the trash, I would feel guilty.

    strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

77. If I DID NOT separate recycling from the rest of my trash then others in my residence hall would judge me negatively.

    strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

78. I would judge someone negatively if they DID NOT separate their recycling from the rest of their trash.

    strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

79. Our environmental problems cannot be ignored.

    strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

80. I am not concerned about the environment.

    strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

81. I feel a moral obligation to protect the environment.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

82. Every citizen must take responsibility for the environment.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

83. Authorities rather than citizens are responsible for the environment.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

84. I would be willing to pay more tuition if the money went to support university environmental programs / purposes?

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

85. I would sign a petition in support of tougher environmental laws.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

86. I would contribute money to an environmental organization.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

87. I would participate in a demonstration against companies that are harming the environment.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

88. I try not to buy from companies that are harming the environment.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

89. I would be willing to pay more tuition if the money went to programs focused on reducing poverty.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

90. Environmental protection is beneficial to my health.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

91. Protecting the environment will threaten jobs for people like me.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

92. Environmental protection will help people have a better quality of life.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

93. Laws that protect the environment limit my choices and personal freedom.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

94. Environmental protection will provide a better world for me and future generations.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

95. The effects of pollution on public health are worse than we realize.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

96. Environmental protection benefits everyone.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

97. Pollution generated in one country harms people all over the world.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

98. Humans are severely abusing the environment.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

99. Despite our special abilities humans are still subject to the laws of nature.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

100. Plants and animals have as much right as humans to exist.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

101. We are approaching the limit of the number of people the earth can support.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

102. When humans interfere with nature it often produces disastrous consequences.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

103. Human ingenuity will insure that we do NOT make the earth unlivable.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

104. Humans have the right to modify the natural environment to suit their needs.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

105. The earth has plenty of natural resources if we just learn how to develop them.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

106. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

107. Over the next several decades. thousands of species of plants and animals will become extinct.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

108. While some local plants and animals may have been harmed by environmental degradation, over the whole earth there has been little effect.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

109. The balance of nature is delicate and easily upset.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

110. Claims that we are changing the climate are greatly exaggerated.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

111. If things continue on their present course, we will soon experience a major ecological catastrophe.

strongly agree / somewhat agree / neither agree nor disagree / somewhat disagree / strongly disagree

Appendix B: Survey Design

All question marked with a negative number denote that a negative response equates to a
        positive value.

All the categories listed for this survey are directly related either to the theoretical framework for
        this dissertation (please refer to Figure 12) or to a category of sustainable behavior
        based generally on LEED criteria (water, energy, transportation, resource consumption
        and waste).

Questions that measure **<u>Demographic Information</u>**:

     1 - Is your current residence hall the first place you have lived as an adult?

     2 - Is this your first year living in a Residence Hall?

     3 - How old are you?

     4 - Which year in school are you?

     5 - How do you identify yourself?

     6 - Where are you from?

     7 - Which Residence Hall do you live in?

     8 - Including yourself, how many people live in your residence hall suite? Or, if you do not live in a
            suite, how many people live in your residence hall room?

     9 - Is your Residence Hall LEED certified?

     10 - Are you a part of a Residence Hall LLC?

     11 - Were you were able to choose which Residence Hall you wanted to live in? and if so, which
            factors played an important role in your choice? (please check all that apply)

Questions that measure **<u>Student's Sense of Community</u>**:

     12 - Do you consider the students on your residence hall floor a community?

     13 - Do you consider the students in your residence hall building a community?

     14 - Do you consider the students on your campus a community?

     30 - Are you aware of how careful other students in your residence hall are about recycling?

     70 - To what extant do you consider yourself a part of your local neighborhood community?

Questions that measure **<u>Ecological Values</u>**:

     15 - Does your campus promote sustainable living?

     16 - Was your choice of university influenced by sustainable programs?

     18 - Choose up to three 'green' behaviors that you think are important to incorporate into your
            daily life…

40 - How important is it to you to buy organic and/or free-range food?

41 - Do you think its important to buy local?

79 - Our environmental problems cannot be ignored

Questions that measure **Pro-environmental Behaviors and Habits**:

Water:

19 - How often do you shower in a normal school week?

20 - How long is your average shower?

21 - Do you ever wash up at a sink instead of taking a shower?

-22 - Do you feel its ok to take a longer shower because you live in a residence hall with good water efficiency?

-23 - Do you always flush when you pee?

Energy:

25 - Are you careful about turning off appliances and electronics when they are not in use?

-26 - Do you feel that its ok to leave lights on if they are energy efficient lights?

Recycling:

28 - How careful are you about recycling your trash?

32 - Do you have a reusable shopping bag?

Transportation:

55 - How often do you use public transportation?

56 - Do you store a bike at your residence hall?

58 - Do you use the Bubbler program? (or any free bike program?)

59 - How often do you bike?

-60 - Do you have a car at your residence hall?

-61 - How often do you drive?

General:

34 - How often do you cook for yourself in your residence hall kitchenette?

37 - How often do you eat at a residence hall cafeteria in a normal school week?

38 - How many times a week do you eat at the university Union in a normal school week?

-39 - How often do you bring fast food / pizza to your residence hall in a normal school week?

42 - Do you know where the closest local farmers market happens?

43 - When you get coffee or tea to go at a shop how often do you use your own travel mug?

47 - What kind of local shops do you frequent? (please check all that apply)

48 - How often do you shop at a resale shop?

49 - Are you careful to shop for items that contain recycled content?

Questions that measure **Willingness to Act**:

84 - I would be willing to pay more tuition if the money went to support university environmental programs / purposes?

85 - I would sign a petition in support of tougher environmental laws.

86 - I would contribute money to an environmental organization.

87 - I would participate in a demonstration against companies that are harming the environment.

88 - I try not to buy from companies that are harming the environment.

89 - I would be willing to pay more tuition if the money went to programs focused on reducing poverty.

Some questions adapted from the following sources:

Jagers, Sverker C. "In Search of the Ecological Citizen." *Environmental Politics* 18, no.1 (February 2009): 18-36.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Questions that measure **Perceptions of Place**:

29 - Do you have a recycling container in your room / suite?

33 - Do you have access to a kitchenette?

35 - What factors encourage you to use the kitchenette? (please check all that apply)

36 - What factors discourage you from using the kitchenette? (please check all that apply)

44 - Do you have storage for dishes in your residence hall room / suite?

45 - Would adding storage to your residence hall room / suite help you to create less waste?

46 - Where in your residence hall room / suite would you like to have more storage? (please check all that apply)

53 - Is it easy for you to go grocery shopping?

54 - Is there a comfortable public bus stop near your residence hall?

57 - Is it easy to store a bike at your residence hall?

62 - Is it easy to keep a car at your residence hall?

72 - Are there any sustainable habits that you would like to incorporate into your daily life at the residence hall that you find difficult to actuate? What are they? What would help?

Actual versus Perceived Distance:

63 - How close is a comfortable public bus stop?

64 - How often do you study at a local coffee shop or public library?

65 - How close is the nearest Goodwill or resale shop?

66 - How close is your favorite grocery store?

67 - How close is the nearest pharmacy?

68 - How often do you eat at a local restaurant?

69 - How close is the nearest farmer's market?

71 - In the warmer months of the school year, how often do you enjoy 'nature' within the city (walking trails, bike paths, green spaces by the river or lakeshore)?

The concept of perceived versus actual distance and the idea of walkability come from:

Speck, Jeff. *Walkable City: How Downtown Can Save America, One Step at a Time*. New York: North Point Press, 2012.

Questions that measure **Personal and Subjective Norms**:

17 - Did you grow up in an ecologically conscious household?

24 - Did you pay attention to your water use in the household you grew up in?

27 - Did you pay attention to your energy use in the household you grew up in?

28 - How careful are you about recycling your trash?

31 - Did you recycle in the household you grew up in?

50 - Approximately how much stuff for daily living did you buy for your residence hall room / suite when you moved in? (includes towels, furniture, chairs, shelving, microwave, hot plate, bedding, shower equipment, etc…)

51 - Did you buy any of this stuff used?

52 - How many of these items will you no longer need once you move out of the residence hall? (please check all that apply)

76 - If I DID NOT separate recycling from the rest of the trash, I would feel guilty

77 - If I DID NOT separate recycling from the rest of my trash then others in my residence hall would judge me negatively

78 - I would judge someone negatively if they DID NOT separate their recycling from the rest of their trash

Some questions adapted from the following sources:

Aguilar-Luzon, Maria del Carmen, Jose Miguel Angel Garcia-Martinez, Antonia Calvo-Salguero, and Jose Maria Salinas. "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior." *Journal of Applied Social Psychology* 42, no.11 (2012): 2797-2833.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Questions that measure **<u>Attitude Towards Behaviors</u>**:

73 - What degree of moral obligation do you feel with regard to separating recycling from the rest of the trash in your daily life at the residence hall?

74 - What degree of moral obligation do you feel with regard to separating recycling from the rest of you trash outside of the residence hall?

75 - It would be morally incorrect for me NOT to separate recycling from the rest of the trash

81 - I feel a moral obligation to protect the environment

Adapted from the following sources:

Aguilar-Luzon, Maria del Carmen, Jose Miguel Angel Garcia-Martinez, Antonia Calvo-Salguero, and Jose Maria Salinas. "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior." *Journal of Applied Social Psychology* 42, no.11 (2012): 2797-2833.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Questions that measure **<u>Ascription of Responsibility</u>**:

-80 - I am not concerned about the environment

82 - Every citizen must take responsibility for the environment

-83 - Authorities rather than citizens are responsible for the environment

Adapted from the following sources:

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Questions that measure **<u>Awareness of Consequences — Egocentric</u>**:

90 - Environmental protection is beneficial to my health

-91 - Protecting the environment will threaten jobs for people like me

-93 - Laws that protect the environment limit my choices and personal freedom

94 - Environmental protection will provide a better world for me and future generations

-103 - Human ingenuity will insure that we do NOT make the earth unlivable

-104 - Humans have the right to modify the natural environment to suit their needs

Adapted from the following sources:

Stern, Paul C., Thomas Dietz, and Gregory A. Guagnano. "The New Ecological Paradigm in Social-Psychological Context." *Environment and Behavior* 27, no.6 (November 1995): 723-743.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Dunlap, Riley A., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56, no.3 (2000): 425-442.

Questions that measure **<u>Awareness of Consequences — Social</u>**:

92 - Environmental protection will help people have a better quality of life

95 - The effects of pollution on public health are worse than we realize

96 - Environmental protection benefits everyone

97 - Pollution generated in one country harms people all over the world

99 - Despite our special abilities humans are still subject to the laws of nature

101 - We are approaching the limit of the number of people the earth can support

-105 - The earth has plenty of natural resources if we just learn how to develop them

Adapted from the following sources:

Stern, Paul C., Thomas Dietz, and Gregory A. Guagnano. "The New Ecological Paradigm in Social-Psychological Context." *Environment and Behavior* 27, no.6 (November 1995): 723-743.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Dunlap, Riley A., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56, no.3 (2000): 425-442.

Questions that measure **<u>Awareness of Consequences — Biospheric</u>**:

100 - Plants and animals have as much right as humans to exist

102 - When humans interfere with nature it often produces disastrous consequences

-106 - The balance of nature is strong enough to cope with the impacts of modern industrial nations

107 - Over the next several decades. thousands of species of plants and animals will become extinct

-108 - While some local plants and animals may have been harmed by environmental degradation, over the whole earth there has been little effect

109 - The balance of nature is delicate and easily upset

-110 - Claims that we are changing the climate are greatly exaggerated

Adapted from the following sources:

Dunlap, Riley A., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56, no.3 (2000): 425-442.

Stern, Paul C., Thomas Dietz, and Gregory A. Guagnano. "The New Ecological Paradigm in Social-Psychological Context." *Environment and Behavior* 27, no.6 (November 1995): 723-743.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Aguilar-Luzon, Maria del Carmen, Jose Miguel Angel Garcia-Martinez, Antonia Calvo-Salguero, and Jose Maria Salinas. "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior." *Journal of Applied Social Psychology* 42, no.11 (2012): 2797-2833.

Questions that measure **<u>Awareness of Consequences — General</u>**:

98 - Humans are severely abusing the environment

111 - If things continue on their present course, we will soon experience a major ecological

catastrophe

Adapted from the following sources:

Dunlap, Riley A., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56, no.3 (2000): 425-442.

Aguilar-Luzon, Maria del Carmen, Jose Miguel Angel Garcia-Martinez, Antonia Calvo-Salguero, and Jose Maria Salinas. "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior." *Journal of Applied Social Psychology* 42, no.11 (2012): 2797-2833.

Questions that measure **<u>New Ecological Paradigm Scale</u>**:

98 - Humans are severely abusing the environment

99 - Despite our special abilities humans are still subject to the laws of nature

100 - Plants and animals have as much right as humans to exist

101 - We are approaching the limit of the number of people the earth can support

102 - When humans interfere with nature it often produces disastrous consequences

-103 - Human ingenuity will insure that we do NOT make the earth unlivable

-104 - Humans have the right to modify the natural environment to suit their needs

-105 - The earth has plenty of natural resources if we just learn how to develop them

-106 - The balance of nature is strong enough to cope with the impacts of modern industrial

nations

109 - The balance of nature is delicate and easily upset

-110 - Claims that we are changing the climate are greatly exaggerated

111 - If things continue on their present course, we will soon experience a major ecological catastrophe

Adapted from the following sources:

Dunlap, Riley A., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56, no.3 (2000): 425-442.

Aguilar-Luzon, Maria del Carmen, Jose Miguel Angel Garcia-Martinez, Antonia Calvo-Salguero, and Jose Maria Salinas. "Comparative Study Between the Theory of Planned Behavior and the Value-Belief-Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior." *Journal of Applied Social Psychology* 42, no.11 (2012): 2797-2833.

Garling, Tommy, Satoshi Fujii, Anita Garling, and Cecilia Jakobsson. "Moderating Effects of Social Value Orientation on Determinants of Proenvironmental Behavior Intentions." *Journal of Environmental Psychology* 23 (2003): 1-9.

Stern, Paul C., Thomas Dietz, and Gregory A. Guagnano. "The New Ecological Paradigm in Social-Psychological Context." *Environment and Behavior* 27, no.6 (November 1995): 723-743.

Appendix C: Focus Group Guideline

Patterns in Daily Life: Readdressing Residence Hall Design

☐ Confirm all participants are <u>undergraduates</u> living in
         Riverview / Cambridge / Sandburg East / Sandburg South, West, or North

Leading Questions:

Community:

☐ To what extent do you consider the students on your residence hall <u>floor</u> a community?

☐ To what extent do you consider the students in your residence hall <u>building</u> a community?

☐ To what extent do you consider the students on your <u>campus</u> a community?

☐ What spaces in your residence hall do you associate with the idea of community?

☐ To what extent do you consider yourself a part of your <u>local neighborhood</u> community?

☐ When I say 'your neighborhood' where do you think of? What are its boundaries?

Recycling:

☐ How careful are you about recycling?

☐ How aware are you of other people's recycling habits within your residence hall?

☐ Would someone be judged negatively if they didn't recycle? (how social are these types of behaviors?)

☐ Would you feel guilty if you didn't recycle? Why?

Consumption:

☐ How often to you buy stuff used? (lamps / cloths / etc) or do you tend to buy new? Why?

☐ If something breaks, like a lamp for example, how likely are you to get it fixed? or would you just get another one?

☐ Would someone be judged negatively for having used stuff?

☐ What places off campus do you visit regularly?

Water/Energy:

☐ How careful are you about your water and energy use?

☐ How aware are you of other people's water / energy use within the residence hall?

☐ If there are efficient fixtures how obligated do feel to worry about water / energy use?

Ecological Beliefs:

☐ Do you feel that you are morally obligated to behave in an ecologically conscious way?

☐ Are there 'green' spaces that you visit frequently?

☐ Are ecological concerns your responsibility? (to recycle / pick up trash / to not use cars / to buy and eat locally / etc)

☐ How does Sandburg's / Riverview's / Cambridge's building and location help or not help you to behave ecologically? (storage / public or private spaces / proximity / etc)

Concluding Question:

☐ Do you agree with the idea that living in the residence hall is training you for future independent living?

SURVEY Reminder

Appendix D: Focus Group Consent Form

Informed Consent
UW - Milwaukee

IRB Protocol Number: UWM - 17.259

IRB Approval date: Monday, April 3rd, 2017

University of Wisconsin – Milwaukee
Consent to Participate in Focus Group Research

Study Title: Patterns in Daily Life: Readdressing Residence Hall Design

Person Responsible for Research: Sarah Keogh, PhD Candidate (Advisor: Josef Stagg)

Study Description: The purpose of this research study is to explore the relationship between specific residence hall design elements and daily behavior patterns of residence hall residents. Approximately 45 subjects will participate in this study. If you agree to participate, you will be asked to participate in a focus group. A focus group is a discussion with a group of people about a certain topic. In this focus group you will be asked to discuss/share your experiences about your daily life in the residence hall as well as your daily life within the surrounding Milwaukee neighborhoods. This will take approximately hour and a half of your time and the focus group discussion will be audio recorded.

Risks / Benefits: Risks that you may experience from participating are considered minimal. There may be some questions that make you uncomfortable and you can feel free not to answer those questions. With focus groups there is always the risk that someone in the group will share your responses with others who were not in the group. In order to minimize this risk please do not share anything you do not want others to know. There are no costs for participating. Other than the food offered during the focus group meeting, there are no benefits to you other than to further this research.

Confidentiality: In the focus group your name will not be used. Each participant will be given a number and the group will refer to each other using these numbers during our discussions. Due to the group nature of the focus group, confidentiality cannot be guaranteed. Your responses will be treated as confidential and any use of your name and or identifying information about you or anyone else will be removed during the transcription process so that the transcript of the group conversation is deidentified. All study results will be reported without identifying information so that no one viewing the results will ever be able to match you with your responses. Direct quotes may be used in publications or presentations. Data from this study will be saved on a password-protected computer in a locked room, 438, in the Architecture building on UWM campus until May of 2018. Only Sarah Keogh will have access to your information. However, the Institutional Review Board at UW-Milwaukee or appropriate federal agencies like the Office for Human Research Protections may review this study's records. Audio recordings will be destroyed at the end of May 2018.

Voluntary Participation: Your participation in this study is voluntary. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with the University of Wisconsin Milwaukee.

Who do I contact for questions about the study: For more information about the study or study procedures, contact Sarah Keogh at shkeogh@uwm.edu.

Who do I contact for questions about my rights or complaints towards my treatment as a research subject? Contact the UWM IRB at 414-229-3173 or irbinfo@uwm.edu.

Research Subject's Consent to Participate in Research:
To voluntarily agree to take part in this study, you must be 18 years of age or older. By signing the consent form, you are giving your consent to voluntarily participate in this research project.

_____
Printed Name of Subject/Legally Authorized Representative

_____   _____
Signature of Subject/Legally Authorized Representative   Date

Appendix E: New Study — Notice of IRB Exempt Status

Melissa Spadanuda
IRB Manager
Institutional Review Board
Engelmann 270
P. O. Box 413
Milwaukee, WI 53201-0413
(414) 229-3173 *phone*
(414) 229-6729 *fax*

http://www.irb.uwm.edu
spadanud@uwm.edu

UNIVERSITY of WISCONSIN

UWMILWAUKEE

Department of University Safety & Assurances

New Study - Notice of IRB Exempt Status

Date: March 17, 2017

To: Josef Stagg, PhD
Dept: Architecture

Cc: Sarah Keogh

IRB#: 17.259
Title: The Relationship Between Place and Identity: Readdressing Environmental Thinking in Residence Hall Design

After review of your research protocol by the University of Wisconsin – Milwaukee Institutional Review Board, your protocol has been granted Exempt Status under Category 2 as governed by 45 CFR 46.101(b).

This protocol has been approved as exempt for three years and IRB approval will expire on March 16, 2020. If you plan to continue any research related activities (e.g., enrollment of subjects, study interventions, data analysis, etc.) past the date of IRB expiration, please respond to the IRB's status request that will be sent by email approximately two weeks before the expiration date. If the study is closed or completed before the IRB expiration date, you may notify the IRB by sending an email to irbinfo@uwm.edu with the study number and the status, so we can keep our study records accurate.

Any proposed changes to the protocol must be reviewed by the IRB before implementation, unless the change is specifically necessary to eliminate apparent immediate hazards to the subjects. The principal investigator is responsible for adhering to the policies and guidelines set forth by the UWM IRB, maintaining proper documentation of study records and promptly reporting to the IRB any adverse events which require reporting. The principal investigator is also responsible for ensuring that all study staff receive appropriate training in the ethical guidelines of conducting human subjects research.

As Principal Investigator, it is also your responsibility to adhere to UWM and UW System Policies, and any applicable state and federal laws governing activities which are independent of IRB review/approval (e.g., FERPA, Radiation Safety, UWM Data Security, UW System policy on Prizes, Awards and Gifts, state gambling laws, etc.). When conducting research at institutions outside of UWM, be sure to obtain permission and/or approval as required by their policies.

Contact the IRB office if you have any further questions. Thank you for your cooperation and best wishes for a successful project

Respectfully,

Melissa C Spadanuda

Melissa C. Spadanuda
IRB Manager

Appendix F: Modification/Amendment Notice of IRB Exempt Status

Melody Harries
IRB Administrator
Institutional Review Board
Engelmann 270
P. O. Box 413
Milwaukee, WI 53201-0413
(414) 229-3182 *phone*
(414) 229-6729 *fax*

http://www.irb.uwm.edu
harries@uwm.edu

UNIVERSITY of WISCONSIN

UW**MILWAUKEE**

Department of University Safety & Assurances

Modification/Amendment Notice of IRB Exempt Status

Date: April 3, 2017

To: Josef Stagg, PhD
Dept: Architecture

CC: Sarah Keogh

IRB#:   17.259
Title: The Relationship Between Place and Identity: Readdressing Environmental Thinking in Residence Hall Design

After review of your proposed changes to the research protocol by the University of Wisconsin – Milwaukee Institutional Review Board, your protocol still meets the criteria for Exempt Status under Category 2 as governed by 45 CFR 46.101 subpart b, and your protocol has received modification/amendment approval for:

- Updating recruitment method
- Minor change to survey
- Adding focus groups

This protocol has been approved as exempt for three years and IRB approval will expire on March 16, 2020. If you plan to continue any research related activities (e.g., enrollment of subjects, study interventions, data analysis, etc.) past the date of IRB expiration, please respond to the IRB's status request that will be sent by email approximately two weeks before the expiration date. If the study is closed or completed before the IRB expiration date, you may notify the IRB by sending an email to irbinfo@uwm.edu with the study number and the status, so we can keep our study records accurate.

Any proposed changes to the protocol must be reviewed by the IRB before implementation, unless the change is specifically necessary to eliminate apparent immediate hazards to the subjects. The principal investigator is responsible for adhering to the policies and guidelines set forth by the UWM IRB, maintaining proper documentation of study records and promptly reporting to the IRB any adverse events which require reporting. The principal investigator is also responsible for ensuring that all study staff receive appropriate training in the ethical guidelines of conducting human subjects research.

As Principal Investigator, it is also your responsibility to adhere to UWM and UW System Policies, and any applicable state and federal laws governing activities which are independent of IRB review/approval (e.g., FERPA, Radiation Safety, UWM Data Security, UW System policy on Prizes, Awards and Gifts, state gambling laws, etc.). When conducting research at institutions outside of UWM, be sure to obtain permission and/or approval as required by their policies.

Contact the IRB office if you have any further questions. Thank you for your cooperation and best wishes for a successful project.

Respectfully,

Melody Harries

Melody Harries
IRB Administrator

Appendix G: Residence Hall LLC Placements, 2016-2017

Cambridge Commons:

      Local 2 Global

      Art & Design

      Architecture Sustainability

Sandburg East:

      Architecture Design

      Honors 2

Sandburg North:

      Health Professions

      Education & Leadership

      Career Quest

Sandburg South:

      Business Panthers

      Engineering

      Transfer

Sandburg West:

      American Sign Language

      Music

      Dance

      Social Justice, Diversity, and Pride

Riverview:

      U1.0 I'm First

      Film, Video, Animation, and New Genres

Sarah Helen Keogh

Education

Dissertation Title: The Built Landscape and Ecological Behavior: Patterns for Readdressing Environmental Thinking in Residence Hall Design

2008   Master of Architecture
        School of Architecture and Urban Planning
        University of Wisconsin-Milwaukee; Milwaukee, WI
        Thesis Title: "Staging the Urban Edge"
        Thesis Advisor: Professor Grace La

2004   BA Art History
        Department of Art History
        University of Wisconsin-Madison; Madison, WI
        Undergraduate Mentor: Professor Gail Geiger

Teaching Experience

School of Architecture
University of Wisconsin-Milwaukee, Milwaukee, WI.

2018-2019   **Adjunct Professor**
             Architecture 723: Fundamentals of Ecological Architecture
             [3 credit graduate seminar - sustainability certification requirement]

             Architecture 420: Architectural Design II
             [6 credit foundation studio]

             Architecture 410: Architectural Design I
             [6 credit foundation studio]

2015-2016   **Adjunct Professor**
             Architecture 190: The Process of Architecture: Creating Spatial Organization
             [3 credit introductory course - 2 of 2]

             Architecture 190: The Language of Architecture: Basics of Design Representation
             [3 credit introductory course - 1 of 2]

2014-2015   **Adjunct Professor**
Architecture 550/750: Seminar in Building Types and Settings
[3 credit graduate / undergraduate seminar]

Architecture 320: Fundamentals of Architectural Design II
[6 credit foundation studio]

Architecture 190: Creating Spatial Organization
[3 credit introductory course]

Thesis Committee: Patrick Wesley
Thesis Title: "A Mission in Madison: A Look at Contemporary Catholic Architecture"
[3 credit final Master's requirement]

2013-2014   **Adjunct Professor**
Architecture 320: Fundamentals of Architectural Design II
[6 credit foundation studio]

Architecture 300: Western Theory and History
Online Course
[3 credit undergraduate course]

2012   **Teaching Assistant**
Architecture 300: Western Theory and History
[3 credit undergraduate course]

Related Academic and Design Experience

2015-2016   **Instructor**
UWM Gear Up Program Workshop Series
University of Wisconsin-Milwaukee, Milwaukee, WI.
[high school recruitment workshops]

2007-2009   **Architect**
Rinka Chung Architecture
Milwaukee, WI.

2006-2007   **Architect Intern**
American Design
Milwaukee, WI.

2007	**Research Assistant**
	to Professor Grace La
	School of Architecture
	University of Wisconsin-Milwaukee, Milwaukee, WI.

2006-2008	**Lab Technician**
	Rapid Prototyping Lab
	School of Architecture
	University of Wisconsin-Milwaukee, Milwaukee, WI.

2006	**Research Assistant**
	to Professor Jim Wasley
	School of Architecture:
	University of Wisconsin-Milwaukee, Milwaukee, WI.

Service activities

| 2018 | **Guest Critic** |
| | UWM-SARUP Master's Thesis Day |

| 2017 | **Submissions Reviewer** |
| | Americans for the Advancement of Sustainability in Higher Education Conference |

| 2015-2016 | **Creator / Coordinator** |
| | PhD SARUP Lightning Talks Series |

| 2010-2015 | **Student Representative** |
| | UWM Department of Architecture PhD Committee |

Presentations and Publications

2017	*"Readdressing Environmental Thinking in Residence Hall Design,"*
	paper presentation at **Americans for the Advancement of Sustainability in Higher Education Conference and Expo**
	San Antonio, TX.

2015	*"Plumbing in the Hull House and a Shifting American Identity,"*
	paper presentation at **Vernacular Architecture Forum**
	Chicago, IL.

2015	*"Placing the Golden Spike: Uneasy Temporality in the Anthropocene,"* Invited Article in **Edge Effects** (posted April 21, 2015). http://www.edgeeffects.net.
2014	*"The Built Landscape: a Tool for Exploring Culture / Nature Relationships,"* paper presentation at **The Nelson Institute - Center for Culture, History, Environment Symposium** University of Wisconsin-Madison, Madison, WI.
2012	*"The Milwaukee River: New Cultural Landscapes in a Place of Recreation and Industry,"* paper presentation at **Urban History Association Conference: The Cosmopolitan Metropolis** Columbia University, New York City, NY.
2012	*"The Intersection of Vernacular Architecture and Environmental History,"* paper presentation at **Vernacular Architecture Forum** University of Wisconsin-Madison, Madison, WI.
2011	*"Ecologies of Community, Landscape, and Region: Reconfiguring the Field during Urban Rebuilding,"* paper presentation at **Second Erasing Boundaries Symposium: Educating at the Boundaries: Community Matters** Hunter College, New York City, NY.
2010	*"The Disintegration of Urban Ground,"* paper presentation at **Midwest Interdisciplinary Graduate Conference** University of Wisconsin-Milwaukee, Milwaukee, WI.
2009	*"Staging the Urban Edge" Calibrations 3* (2009): 170-171.