ABSTRACT

RIDER, TRACI ROSE. Exploring the Integration of Sustainability and Green Building Themes within Formal Architectural Education. (Under the direction of Dr. Wayne Place.)

The purpose of this research is to explore the integration of sustainability and green building themes into formal architectural education. Because there has been limited research surrounding this topic, a grounded theory approach is used to conduct this study. This research is rooted in social constructivism, ontologically based in relativism and epistemologically in naturalistic inquiry, understanding that the individual experiences of the faculty members are rooted in context and personal history. In depth interviews were held with selected participants, each of whom are popularly perceived as leaders in green building and sustainability in architectural education. Through a cyclical coding process, themes emerged from the interviews, and ultimately centered around two core categories at two different levels: Student Engagement at the instructional methods level, and a Revisioning of the Field at the philosophical level. These themes and their implications are explored in depth in the context of methods, opportunity, and barriers in architectural coursework, programs and larger university structures. This study concludes with possible avenues for further research regarding the integration of new themes in architectural education.
Exploring the Integration of Sustainability and Green Building Themes within Formal Architectural Education

by
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A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy

Design

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DEDICATION

To my husband, Dan, for keeping me fed, happy and healthy
on my never-ending explorations.
BIOGRAPHY

Traci is from Xenia, Ohio, and is married to a fellow Ohioan and designer, Dan. They have a 21-month old son, Beckett. Her family all resides in Ohio, with the exception of her brother, who is in the Army.

Traci received her Bachelors in Architecture from the University of Cincinnati in 2000. After working with a number of smaller firms while in school, and working with HOK (Houston) directly after graduation, she became deeply interested in sustainability through the eyes of the building professions. Finding deep interest in the psychology of designers “going green,” Traci returned to Cornell University for her Masters in Design and Environmental Analysis, which she completed in January 2006. Entitled “Education, Environmental Attitudes and the Design Professions,” her research looked at factors impacting environmental attitudes of designers including environmental education, learned associations and informal influences. Interested in the holistic notion of sustainability and that philosophy within the building industries, Traci co-founded Trace Collaborative, LLC in 2007. Trace Collaborative focuses on the process of green building, in addition to community engagement and education through sustainability and the built environment.

A past-chair of the Emerging Green Builders (EGB) Committee of the U.S. Green Building Council, Traci has consulted with USGBC on their EGB initiative for a number of years. An original member of the national committee, her involvement with national initiatives have included a national design competition, local design charrettes partnering with environmental education, annual events at Greenbuild, and local EGB efforts.
throughout the country. Because of her involvement in the EGB, she was granted the prestigious individual USGBC Leadership Award in Education for 2005 and was included in a group labeled as “The Re-Inventors” in Vanity Fair’s Green Issue in May 2006, in the company of established visionaries in sustainability such as William McDonough, Paul Hawken and Sim van der Ryn. Traci has authored *Green Building Guidelines for Students and Young Professionals*, published by W.W. Norton in 2009. She has also co-authored a second book, *Understanding Green Building Materials*, currently in publication.
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CHAPTER 1: Introduction and Problem Area

1.1. Positioning the Problem

As concerns continue to escalate about the state of the environment, many professions are looking at how their practices can become more environmentally friendly. The design and construction industries cannot deny that they are a major contributors to both climate change and environmental effects as illustrated by any number of statistics: nearly 40% of carbon dioxide emissions in the United States are from buildings\(^1\) and approximately 40% of landfill waste is produced by construction. Specifically, practitioners, students, and specialists in the field have recently begun to question whether the next generation of architects and designers will have the skill set necessary to address the dramatically altered state of the environment and the field’s contribution to it (EDES 2006; Gould and Hosey 2006; Mazria 2006).

The American Institute of Architects (AIA), architecture’s professional organization, has adopted an initiative that all new buildings and major renovations be carbon-neutral by 2030, focusing primarily on energy, reducing carbon emissions, and lessening the impact of buildings on climate change. The U.S. Green Building Council, a non-profit central to the green building movement, has contributed to the discussion by establishing a number of applicable rating systems for various building types that can be referenced to produce a more holistically ‘green’ final product. In the fall of 2008 the AIA altered its continuing education requirements to include a mandatory four-hour focus on sustainable design (of the annual eighteen hours required). There are endless resources and initiatives for architecture professionals to both get involved and update both their knowledge base and their projects

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\(^1\) http://www.usgbc.org/News/PressReleaseDetails.aspx?ID=3124
with respect to sustainability, yet few of these resources have been translated or implemented within the formal education of the next generation – those currently in school.

As increased emphasis is placed on sustainable, high-performance building strategies and professional training, formal design education must incorporate new theories on the subject, embracing green design elements and high performance building strategies into an already overflowing curriculum. The focus of this study is formal, accredited architecture programs, unlike the more informal trade or residential programs. A few select accredited programs around the country have established themselves as leaders of the movement by incorporating environmental education within their design programs; sustainability and green building issues are arguably viewed as integral to every course and not as a separate concentration for study. Other programs begin to offer select courses to their students as electives, but have not reached a level of full integration of green building and high-efficiency design. The method of incorporation varies, ranging from vernacular design, which is more commonly understood to be a building method or style addressing a certain region’s particular climate and context, to ecological thinking to building science and beyond.

The term “sustainability” is used broadly and in a wide variety of contexts, and is frequently seen as synonymous with green building. The position of this study is that green building is only one component of true sustainability, which by definition requires no negative impacts on the environment. Even still, regenerative design – as a step beyond sustaining, instead improving the status quo - should be the ultimate goal of the design and construction industries. While the terms sustainability and green design may seem to be used
interchangeably within this study, please note the slight nuances of each application, and that both scopes are to be addressed as appropriate in this study.

As one of our oldest professions, the field of architecture is entrenched in tradition. The education of architects has evolved from a master/apprentice relationship working toward a Master Builder status, to the current highly rigorous set of courses required for any accredited program. Education now focuses on grooming a jack-of-all-trades professional who excels in issues of design, coordination, presentation, and communication, to name only a few. Additionally, architecture offices emphasize repeated processes, design and strategies within their daily activities, such as design styles, detailing building elements and task assignments, which are based on the path that is easiest and most familiar; this approach favors the elements and process used in the office setting the week before, or the project before, or the years before. To alter this repetition and pattern necessitates slowing the churn of standard design and documentation procedures and revisiting go-to assumptions. Various processes are being left out of the daily professional vocabularies that were initially dismissed as less productive and less profitable. Despite the artistic and creative foundation of the field, it is still very much a service profession, productivity and profit based. It is also set in its ways and habits.

1.2. Study Purpose and Significance

This study is designed to explore potential means of incorporating sustainability and green building themes into formal architectural education, and to reveal the various levels of effectiveness. By understanding and unpacking the most common and perceived successful methods of this integration into curriculum such as course type, teaching style, conversations
created, or material covered, guidelines can be drafted to steer the effective integration of sustainability and green building topics within architectural education. Establishing this knowledge base will better enable educators to prepare future generations of architects, who can make successful contributions to the world they inhabit as professionals.

As mentioned previously, the building industry historically has had a large hand in environmental degradation. In light of this, it is of great importance that future practitioners understand and appreciate the myriad of issues surrounding both green building as well as larger scale holistic sustainability, and how the field impacts all scales. There is presently a steep learning curve as senior professionals struggle to remain current regarding relevant issues and to implement green design strategies, and rapidly changing information on materials, technical developments and resources. If students are not introduced to this information until after they have graduated and are practicing, there is no choice but to repeat this learning curve. This study provides insight into how sustainability and green building can be productively and strategically integrated into formal architectural curricula, as well as into potential barriers to this integration.
CHAPTER 2: Review of Related Literature and Topics

A number of topics must be addressed when framing this broad issue, including:

- ecological literacy within architecture
- architectural education
- architectural education assessment
- ecological/environmental education as a singular movement
- curricular theory and content knowledge in higher education
- environmental rhetoric

The frame for this study focuses on literature and works surrounding sustainability (often found in literature as ‘ecological education’) within architecture programs and environmental education.

2.1. Sustainability Themes in Design Education

For the purposes of this study the following terminology is used: the integration of “environmental education” theories into traditional and established design curriculum would result in “ecological literacy” within design education. Therefore, the terms “ecological literacy” and “environmental education” is used interchangeably. There is also a notable difference in these ecological-based terms and the term “sustainability” which is viewed in this study as more comprehensive, including building science based initiatives. As such, there are two different strands of literature to review, and both are reflected in this section.

Though most applicable and appropriate, there are few writings on the use of ecological design approaches in architectural curriculum. The initially found works were both published in 2006; one by the American Institute of Architects’ (AIA) Committee on the
Environment (COTE) and one by the Association for the Advancement of Sustainability in Higher Education’s (AASHE) Alliance for Ecological Design Education (AEDE), based in the Pacific Northwest. The fact that there is so little writing on this subject indicates a gap in the knowledge base. A number of other works have been published regarding sustainability and ecology in architecture, but focus more on the integration of sustainability themes within the practice instead of education (Tanzer and Longoria 2007; Yudelson 2008; 7group and Reed 2009). Another publication addresses programs in green design from an availability and review perspective, without a critical analysis of curricula (Earley 2005).

A review of these two works on ecological literacy within design curricula found that the current standard of success regarding the integration of sustainability is frequently based on one course, not on the integration of themes across the entire curriculum (Gould and Hosey 2006). Through a self-selecting sample of integrated coursework submitted by schools and faculty, Gould and Hosey (2006) also found that many of the most highly ranked architecture programs in the United States do not show notable interest in sustainable design. These findings are similar to a report based on West Coast schools of architecture, which found that students perceive a gap in their education regarding sustainable and ecological principles (EDES 2006). Though the number of studies regarding sustainability design themes in design curricula is small, these two prominent investigations imply that there is a lack of program initiative in the areas of ecology and integration; both studies call for integration of sustainability into the core foundation of the curricula. Gould and Hosey (2006) also call for an ecological rating system for ranking programs to aid in school selection by future students.
2.2. *Environmental Education*

Environmental education is another important indicator in this study and has been addressed by many (Barton 1994; Kohak 2000; Sobel 2004; Stone and Barlow 2005). Previous publications address the collaboration between the education and the environment and concentrate mostly on the influences of David Orr, noted educator and environmentalist at Oberlin College who has focused on the integration of environmental literacy within higher education (Orr 1992; Orr 2004; Orr 2004).

As stated by Gould & Hosey (2006), in ecological literacy:

“Three important traits are clear: ecology concerns relationships, not strictly things; those relationships are between the organisms themselves and between the organisms and their environment; environment may be ‘natural’ or ‘developed’. (p.14)

This view and proposed framework of ecological integration, here within design education specifically, highlights the significance of relationships within ecological design, and the necessary collaboration in the design process. This point of view posits that there must be an awareness of systems beyond the immediate scope of work or the immediate building, and that such awareness underpins an interdisciplinary focus on larger relationships within the environment.

Major barriers to the integration of environmental literacy in higher education at the foundational level have been identified in the literature as program coordination, clarity of course or program criteria, and quality verification for courses offered (Moody, Alkaff et al. 2005). These findings suggest that integration is important, but there is a larger issue of
management within departments and institutions (Yeung 2002; Kim 2003; Moody, Alkaff et al. 2005). Ecological literacy itself was generally seen in the literature to be an important inclusion to design programs (Gould and Hosey 2006), though is not being embraced in many programs. The juxtaposition of these pieces of research indicate that while sustainability themes may be seen as important in programs by faculty and administration, the issues are bureaucratic and managerial.

Similar to the research on managerial difficulties, affective and emotion-based themes are also difficult to incorporate effectively and consistently across courses, though they are found to be important in creating environmental values in students. As declared in the United Nations article *An Inventory for Assessing Environmental Education Curricula*, emphasizing opportunities for increased awareness of environmental issues and the resulting attitudes in environmental education (EE), as noted by the 1977 Tbilisi Declaration, encourages the integration of an affective component to education (Kim 2003). Affective quality - relating to moods, feelings and attitudes - is frequently overlooked, especially in science-based fields such as architecture and engineering, but may be more easily accounted for in the foundational tracks of programs (Moody, Alkaff et al. 2005).

Because of the emphasis on awareness and attitudes reflected in the environmental education literature (Moody, Alkaff et al. 2005), the most effective integration of these themes may in fact be within the pedagogy of inquiry-based learning at the foundation and general education levels that students experience early in their development, regardless of their specific focus or major. However, it has been shown that educators place more emphasis on the integration of sustainability into the courses addressing upper-level applied
knowledge instead of those concentrating on foundational knowledge as seen early in the educational experience (White and Mayo 2005). This shift produces a conflict between the most effective way to implement environmental education (early foundation courses) and the perception of educators as to the most valuable way to educate regarding the environment (upper-level applied knowledge courses).

In sum, literature reviewed concerning environmental education demonstrates that affective elements are important in curriculum and that the affective, foundational level is where most success in environmental education integration is seen and the most information is retained.

2.3. Current Program Review

An initial curriculum review was completed before engaging specific participants for this study to better understand larger program categories with respect to sustainability themes, and which types of programs might host these themes successfully. For this initial evaluation of program type, schools of different integration methods were the focus. Specifically, the review explored a program with an emphasis on ecological design integration; a program with a building science emphasis; and programs that are a hybrid of both ecological design processes and building science.

Though there is not much literature on issues of sustainability addressed by architectural education, a few program strongholds have developed in the field; a variety of schools around the country are perceived to be “green” by reputation. Only a few of these programs have been documented, but remain important as background information to this study. This approach, overlaid with an understanding of the hotspots in green design
education, resulted in the exploration of websites documenting the programs at the University of Oregon, Cal Poly at San Louis Obispo, Carnegie Mellon, and Ball State University. The course descriptions on the websites of these schools do not all read outwardly as being dedicated to sustainability, a solid thread runs through the programs that is difficult to pinpoint but widely recognized. In other words, there may be no indication of sustainability themes in course titles or descriptions at these programs, but there is a common understanding within green design education circles that these themes are being included in courses and curricula.

There are other programs where individuals advocate for the integration of sustainability into courses and curriculum, even if the program is not known for sustainability. It is these individual faculty experiences that are the unit of analysis of this research; they are used to identify common themes regarding levels of success for the integration of sustainability in formal architectural education. The unit of analysis is the incident (Glaser and Strauss 1967); here the incident is an individual educator's attempt to integrate sustainability and green building themes into his/her courses. The premise is that development of such themes closes the gap in the literature as well as lends guidance to other programs interested in implementing sustainable practices in the curriculum.

Based on the different curricular reviews, there are two important – though at times juxtaposed – elements of successfully integrating sustainability and green building strategies into architectural curriculum. While the building sciences concentrate primarily at the scale of the building with measurable and verifiable outcomes, the ecological design emphasis addresses larger contextual issues and their impact on the design process.
Another important element found in these recognized programs is the existence of associated research centers within the school, college or university within which architecture faculty participate. These centers can be either building science or ecology focused, but allow for additional funded research, involvement and initiative beyond what is accommodated in a traditional lecture, seminar, or studio course. Though students have varying access to the research centers depending on the specific school and program structure, the organization of the particular center, and extent of faculty involvement, the existence of these centers indicates that associated faculty members are actively engaged in research and extension regarding environmental issues. This active engagement both reflects and affects their focus and sphere of influence with students, while also leading by example.

Because of the overlapping qualities and elements found within the different programs during the preliminary review of some programs, it is posited that the most successful type of sustainability program within architectural education is a hybrid of the building science and ecological design approaches. One program that stands out, not only from the overview given here, but also within the sustainable design education community, is the University of Oregon. Much of its reputation is based on students’ exposure to building science and research, which is not often aggressively embraced in traditional design programs. Another example of this type of program is Ball State University’s program, associated with their Center for Energy Research/Education/Service (CERES), contributing an obvious emphasis on building science elements. Cal Poly San Louis Obispo is another hybrid program with similar elements and qualities addressing building science and ecology.
The best case scenario and most well-rounded opportunity for students is to attend a program that is a hybrid of the two facets of building science and ecological design, where they would benefit from both perspectives. Though these types of programs may be hard to find, there begins to be identifiable criteria as program descriptions and contents of the program are explored, such as building science research projects or ecological design outreach into the community and environment. As these types of programs are increasingly uncovered, profiled, and thoroughly assessed, their success can be more easily emulated at other schools looking to enhance their dedication to sustainability and green building.

2.4. **Curriculum Design and Assessment**

It is imperative that as society evolves that higher education curriculum evolves as well. This mandate necessitates continued evaluation and updating of curriculum on all fronts, in all subjects. One of the primary topics covered within the education literature concerning curriculum evaluation is the question of what exact qualities are being evaluated and assessed during reviews. It has been proposed within the humanities that emphasis be placed on the actual content of courses, rather than on the application of skills once an individual leaves the program (Helm 2000). Helm (2000) also notes that it may be important to understand the true goals of the curriculum, rather than the content and topics covered. This approach favors the creation of core values and foundational training instead of strictly catering to upper level applied skills over a weaker foundation, and does not place as value on the simple regurgitation of facts and skills without critical thinking and questioning by the student.
More specifically, the issue of quality management within curricula is also an important aspect of evaluation and is well covered in education journals focusing on curricula, outside of design and architecture. Some education experts break curriculum down into three specific aspects including **quality of design (QD)**, **quality of conformance (QC)** and **quality of performance (QP)** (Mergen, Grant et al. 2000; Widrick, Mergen et al. 2002). The **quality of design** category pertains to how well the curriculum addresses the consumer’s requirements, which, in the scope of design curriculum, would be the professional field of architecture and possible employers. The **quality of conformance** criteria addresses how the curriculum satisfies the design requirements and traditional standards, such as the service being provided and the ultimate gratification of position and pay achieved by a graduate. And the **quality of performance** addresses the satisfaction of the end user, in this case the student’s satisfaction with their experience. With foundations taken from earlier work done by Mergen et al. (2000), Widrick et al. (2002) propose measures to evaluate each of these three categories within a program curriculum.

Similarly, Gilbert (2004) notes that there are three levels through which some research programs, such as doctorate programs, can be evaluated: quality of individual projects, as noted by both the professors and the individuals themselves; the quality of the field of study itself and additional contributions to that field; and the completion of specific stated goals, as well as the intrinsic worth of those goals used as a foundation. Both frameworks identify three major – and similar - criteria applicable to all educational disciplines: contributions to the profession, contributions and service to the field, and student satisfaction. Architecture and design are commonly viewed as non-traditional in the overall...
scope of higher education due to the studio as an instructional approach and the resulting alternative culture creating a space for interaction and creativity in the classroom, complete with sleep deprivation, hectic deadlines and various methods of creative release. However, despite this uniqueness, architectural education can still be viewed through this established three-part framework of product, process, and experience.

Architectural education regularly addresses the first level of product with intermediate and final reviews of studio projects throughout the semester, where a design problem is provided and a solution proposed. These products are also used as contributions to the profession, by exemplifying the creation of capable designers. The process level, however, as it is addressed in the assessment literature regarding additional contributions to the field, does not receive much attention in architecture programs, as there is not typically the creation of knowledge within undergraduate programs. There is also the opportunity, though historically underutilized, for projects to contribute to the service in the field. These opportunities are increasing with service and outreach studios that are hosted within various programs. A different type of process, the design process is occasionally emphasized in studio settings pertaining to the creative process and the development of the final product, as referenced earlier. Addressing experience in assessment is similarly difficult in architectural education currently, primarily due to the timely debate around the intrinsic worth of course and curricula goals, related to either the environment or to aesthetics.

Figure 1 shows this three-tiered framework broken out into additional categories of evaluation. Evaluative measures can also be addressed as intrinsic and extrinsic (Gilbert 2004). Extrinsic issues deal with the ultimate “pay-off” of a program, such as achieving
program objectives and goals; intrinsic issues address “questions about the worth or value of the stated objectives themselves” and question other outcomes that may not be addressed in published or stated objectives (Gilbert 2004). Encompassed in the intrinsic values that Gilbert mentions are the curriculum values of awareness and attitudes, noted repeatedly in environmental education evaluation as covered previously (Kim 2003).

![Matrix of standard curriculum evaluation elements](image)

**Figure 1 – Matrix of standard curriculum evaluation elements as revealed through literature**

Methodologically, a number of specific elements can be looked at in curriculum evaluation: courses offered and their sequence in curriculum, including course content and coverage of topics; appropriate faculty expertise; admission requirements; employer satisfaction of the new employees; type of employers recruiting; licensing board results; and starting salaries (Widrick, Mergen et al. 2002). Additionally, in research based programs such as doctorates, elements such as graduate satisfaction and research quality would be reviewed (Gilbert 2004). While some of these elements - such as salary, admission
requirements, and recruiting employers - can be quantified, other aspects are left to qualitative methods such as expert reviewers, especially in the case of the doctoral and research programs.

Another framework to reference regarding course development is Backward Design as described by Wiggins and McTighe (2005). This approach outlines the course development process by identifying the goal of the course first, and then identifying what elements in class may work toward reaching that goal with the students, enhancing the level of true understanding of a topic (Wiggins and McTighe 2005). The notion of understanding is central to the course development process and highlights ‘big ideas’ to prioritize learning, similar to the intrinsic issues noted earlier (Gilbert 2004). This also mirrors the Quality of Design category reviewed by Mergen et.al (2000).

Figure 2 – Wiggins and McTighe’s (2005) diagram for clarifying content priorities
Wiggins and McTighe (2005) identify a ‘big idea’ as a theme that “connect(s) the dots for the learner by establishing learning priorities.” They also use the term ‘linchpin’ as a descriptor for those big ideas; the key to designing courses that work toward true understanding is to identify these ‘big ideas’ and deliberately design tasks around them, instead of touching on every topic that might be of importance in each applicable subject. The subject matter addressed in courses can be categorized into three tiers, as seen in Figure 2. There are elements that are worth encountering, which would provide scope and context. Things that are important to know, such as tasks and overarching theories, comprise the middle level. Core concepts and ‘big ideas’ should be found at the heart of the course. In line with this idea of enduring understanding in course development, six aspects of student performance are identified as evidence of understanding: the ability of the students to explain, interpret, apply, have perspective, empathize, and have self-knowledge. These six facets of understanding ensure that the core topic – or big idea - is wholly comprehended and the knowledge is transferable to other applicable realms. This transferability of knowledge can only truly happen when a deep understanding is achieved.

Understanding that skill-focused courses, as often found in fields such as engineering and architecture, are also frequent and important, Wiggins and McTighe (2005) outline tips for how to implement the ‘big ideas’ in this type of coursework. Specifically, they propose that ‘big ideas’ can be found in the following skill-based elements: the value of the skill and why it is desirable; underlying concepts that support the use and defense of the skill; issues of strategy and effective tactics about when the skill is applicable; and the underlying theory of the skill and why the skill is successful.
To summarize, according to the literature reviewed on curriculum evaluation, three primary perspectives must be assessed when evaluating curriculum: the final product, such as the final project in a studio course; the process of getting to that final stage and what was being explored; and the individual’s experience through the journey. Additionally, these can each be viewed through an **intrinsic** or **extrinsic** lens as shown in Figure 1. Wiggins and McTighe’s framework (2005) shown in Figure 2 is similar in its emphasis on the importance of core values, as mentioned repeatedly in the literature (Helm 2000; Mergen, Grant et al. 2000; Widrick, Mergen et al. 2002; Gilbert 2004). The reviewed literature emphasizes the importance of the development of core values within curriculum, tiered information, and establishing larger goals within programs. Participants’ perceptions and understanding of these curricular elements within their individual programs are explored during the data collection process.

### 2.5. *Architectural Education Assessment*

There are established ways of assessing an accredited school of architecture. Each professional field in design, such as architecture and landscape architecture, has its own accreditation board with criteria, goals, and measurements for curriculum and instruction. These are each public and available online for reference at the different organizational websites.

The National Architectural Accrediting Board (NAAB) is the only recognized agency accrediting professional architectural degree programs in the United States, and it outlines performance criteria to which each professional school must adhere. The evaluation consists of topics such as: program overview; providing support and opportunities to students;
training students for participation in the profession; diversity within the student population; review of the self-assessment process; review of promotional media; sufficient human resources and support staff; physical and reference resources, including studio space, classrooms and library inventory; financial resources within the greater educational institution; and student performance (NAAB 2004). These criteria are judged by a visiting committee that reviews an Annual Program Report, prepared by the school faculty prior to the committee’s arrival, in addition to reviewing selected products of coursework. Similarly, the Landscape Architectural Accreditation Board (LAAB) focuses on: number of faculty, funding, types of courses offered, students’ achievement of goals, and alumni achievement, among others (LAAB 2002). The NAAB and the LAAB adhere to the popular model for reviewing design programs that is partially based on objectivity.

Understanding and implementing these assessment methods and accreditation criteria is typically accomplished through corresponding courses; if a criterion is mentioned, there is a course to address it. Programs often address the requirements on a line-by-line basis, inferring that each requirement outlined in the criterion necessitate a course dedicated to that line item. It is important to understand how each of the programs in this study approach the accreditation requirements, and how it views components within the NAAB checklist.

Revisions to the NAAB Criteria are frequent, detailed, and rigorous. The existing Conditions recently went through the 2008 NAAB Accreditation Review Process to inform the Development of the updated 2009 Conditions for Accreditation, which was enacted on April 1, 2009. As reflected in the Public Comment Edition of the 2009 Conditions for Accreditation, there are now two primary sections of the document: Institutional Support and
Commitment to Continuous Improvement, and Educational Outcomes and Curriculum. The first section, Institutional Support and Commitment to Continuous Improvement, focuses on the mission and culture of the school, as well as resources, annual reports and credentials. The second section, Educational Outcomes and Curriculum, looks at student performance, curricular structure, evaluation, and public information.

The majority of comments received during the 2008 Process Review focused on the thirty-one Student Performance Criteria (SPC) contained in Part 2 of the Conditions document. Comments received from the NAAB’s constituencies voiced recommendations on five primary issues, one of which was a “specific and comprehensive commitment to environmental sustainability.” However, when looking closer at the SPC, the environment is mentioned occasionally and vaguely, and omitted in some potentially valuable locations. For example, the six stated Learning Aspirations for students are:

- Be broadly educated;
- Promote lifelong inquisitiveness;
- Communicate graphically in a range of media;
- Recognize the assessment of evidence;
- Comprehend people, place, and context; and
- Recognize the disparate needs of client, community, and society.

These are generally appropriate though one could take issue with the fifth point from sustainability perspective, “Comprehend people, place, and context.” Historically speaking,

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2 These collateral organizations are: the Association of Collegiate Schools of Architecture (ACSA), the American Institute of Architects (AIA), the American Institute of Architecture Students (AIAS), and the National Council of Architectural Registration Boards (NCARB).
“context” has been taught rigorously and systematically, though the meaning of “context” here is unclear. Traditional courses on architectural context rarely address the long-term environmental context or, for example, its impact on energy usage; instead, “context” in architectural courses focuses on surrounding buildings or urban planning context. Similarly, the last point, “Recognize the disparate needs of client, community, and society” notably leaves out the element of the environment and its inherent needs as something to be considered. These are key omissions for an accreditation process reputed to be interested in truly integrating sustainability.

In a change from the 2004 version of the criteria, the SPC items have been divided into three groups: Critical Thinking and Representation; Integrated Building Practices, Technical Skills and Knowledge; and Leadership and Practice. All Criteria are based on one of two levels of accomplishment: Understanding, or the comprehension of information as an entity into itself; and Ability, surrounding skill development and practical application regarding specific problems. Criteria relating specifically to sustainability and green building are mentioned in the second Realm of SPC, under the headings of Sustainable Design, Environmental Systems Integration, and Building Envelope Systems. However, they are omitted from the third Realm of Leadership and Practice.

There were also repeated comments in the Conditions document referencing individual program ability to self-assess through a framework of criteria to be created by NAAB, for internal and external assessment regarding effectiveness of internal procedures and compliance with best practices. The framework and criteria speak only to external assessment, specifically to a NAAB accreditation committee coming for a scheduled visit, to
address issues as reviewed previously in Section 2.4. Curriculum Design and Assessment.

This research investigation explores the intrinsic issue relating to goals through the lens of curricular assessment not directly addressed by the NAAB framework. Another note of interest in the Public Comment Edition of the 2009 Conditions for Accreditation mentions the ability of programs to implement certain tracks of learning across the curriculum, as opposed to one class in a “unique learning experience.” It is the primary position of this study that sustainability and green building should be addressed in just this way – in a longitudinal approach instead of using a “one book on a bookshelf of topics” mentality.

The NAAB document, as well as the other literature on architectural program evaluation, shows a combination of quantitative and qualitative methods used in traditional accreditation reviews. These are, however, primarily based on extrinsic elements as outlined in the curriculum assessment literature. The obvious gap in design assessment is the intrinsic-process issues, or those questions addressing the value of the ideas taught, and the process by which those ideas are defined and outlined. This concept is described graphically in Figure 3 below.
Figure 3 – Matrix of standard curriculum evaluation elements incorporating architectural accreditation criteria

Another document outlining potential changes to the architecture and design professions is *Building Community: A New Future for Architecture Education and Practice: A Special Report*, authored by Ernest Boyer and Lee Mitgang. In partnership with another paper by Boyer, *Scholarship Reconsidered: Priorities of the Professoriate*, seven essential goals are outlined for the field in *Building Community*:

- An Enriched Mission
- Diversity with Dignity
- Standards without Standardization
- A Connected Curriculum
- A Climate for Learning
- A Unified Profession
Service to the Nation

The two goals that are most important in this research are *Standards without Standardization*, which addresses a balanced design curriculum; and *A Connected Curriculum*, which speaks to a more liberal education and, by association, interdisciplinary knowledge.

Additionally, existing studies do little to address the integration of ecological design to the extent that students perceive to be sufficient, which would be included in the intrinsic realm of curricular assessment. Those few reports that have been done on ecological literacy in architecture programs show that there is a need for more in-depth research regarding the methods of integrating sustainability into formal architectural curriculum by those in the field (EDES 2006; Gould and Hosey 2006), and clarification on the qualifications of these proposed integration methods, which are starting to be rigorously addressed (Bachman and Bachman 2009).

2.6. **Cultures of Architectural Education**

There are number of prevailing cultural generalizations and attitudes currently present within formal architectural education that have the potential to become obstacles for the integration of sustainability. These constructs, established over time, are proliferated in many present-day programs. While any number of cultural constructs could be reviewed regarding architectural education, the following five seem the most important and applicable to this research: *Cult of Personality; Culture of Doing; Product over Process; the Architect as a Creative Icon;* and *The Solitary Designer*. Because these constructs are so closely tied to the development of future practitioners and the students’ development of sense-of-self, these are
significant factors that must be explored in the context of sustainability within both the profession and architectural education.

*Cult of Personality:* The *Cult of Personality* in the field, under which course content focuses less on shared concepts within a program than on a faculty member’s individual interest, undoubtedly exists within design programs. It exists at both at the individual instructor level and at the program level. For example, some programs allow faculty members to select their course topics (including studio), which may allow for a multi-faceted culture within the program and among faculty members. The discourse among faculty is spirited and apparent, allowing the students to understand and resolve different perspectives and approaches toward design. Researcher bias, being a product of one such undergraduate program, favors this approach, which brings varied exposure to the students and allows for each student to select his/her own path and preference, not being indoctrinated by a certain style or approach. This cultural approach values the individual, as well as personal preference, opinions and aesthetics, with the belief that there is no truly unified approach to design.

The emphasis on the individual instructor’s values is primarily based on the indoctrination of students by faculty, with the intent of passing core ideals to future generations. According to the Oxford English Dictionary, the term *profess* stems from having been received into a religious order through vows, which emphasizes the importance of the spoken word and commitment to a field of ideals. Later, however, the term evolved to mean declaring oneself an expert in or of something, or to perform the duties of a teacher. The question becomes: What types of ‘vows’ do architecture professors uphold? Under a “cult of
personality,” faculty member believes, above all, in his/her perspective (or approach, formal expression, etc), and asserts this particular position to their students as sacrosanct. The existence of individual philosophies within a program seems to illustrate that there is no uniform approach to design, though each individual faculty member believes his/her approach to be correct – and therefore tries to propagate it among students.

Other architectural programs, however, are rooted in specific movements such as Modernism; they may also hold a theoretical emphasis where faculty members project and support a uniform position on theoretical design, an approach, or common values within design. This may also be a symptom of personality, though at an institutional level in program personality. In this position, the basis of personality is flipped. With a uniform approach throughout the program, the position is that there is a preferred way to design, such as in the Modernist genre, or that there is a preferred aesthetic. A common perspective, or a common paradigm to which each faculty member refers, guides this unified approach. It is the job of the faculty, though potentially unspoken, to profess these core beliefs within the courses, both studio and otherwise. Programs of this culture value consistency and uniformity, with the belief that their approach to design is the correct one, whether it is in theory, process, formal elements, or philosophy.

This uniform construct poses a potential barrier to sustainability integration because the introduction of new or different themes could be seen as undermining, altering or attacking the values and position of the established philosophies. If an individual or program personality exists, it has likely been created, reiterated and is comfortable for the faculty
members. Given this dedication and perpetuation, it would be difficult for new notions and ideas to enter into the conversation.

**Culture of Doing:** Recently, there seems to be renewed emphasis in architecture programs on “doing” rather than “thinking.” In other words, the school culture focuses on the applied, rather than the theory behind the application. As an example, rather than teaching principles and theories of sustainability in courses, there is a tendency to begin immediately with the U.S. Green Building Council’s (USGBC’s) green building rating system\(^3\) in the form of a checklist. Practitioners who do address sustainable theory, such as Ken Yeang and William McDonough, are often written off as insubstantial and irrelevant, because they are highly conceptual without built works embodying their theories.

This *Culture of Doing* is grounded in the educational emphasis on the desires of the profession. Though students are paying for their education, the value and reputation of the program among professional firms, local and distant, ranks high among a program’s internal priorities. This not only speaks to hiring rates for internships or upon graduation, but it may also encourage donations, partnerships, and events in the school community. Here, the cultural value is assigned to the perception of the program by the profession and the ability for students to create build-able, applicable projects during their education and ready to contribute at the intern level upon graduation; it is based on the belief that without producing students who are attractive to the current profession, the program may cease to be relevant.

In relation to sustainability, a focus on *doing* could translate into an emphasis on applied strategies instead of the inclusion of foundational green theories. As will be

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\(^3\) Leadership in Energy and Environmental Design (LEED)
discussed later, the core ideas of sustainability and green design are viewed as important as specific application strategies, enabling students and practitioners to understand potential trade-offs. A strong foundational knowledge also allows designers to understand the intent of the strategy in question, which informs the critical thinking process through opportunities and potential design criteria.

**Product over Process:** Another cultural construct closely linked to the above issue of doing is the emphasis on *product over process*. Though the first few semesters typically help new students navigate and understand the design process, there is rarely any particular course or coursework that addresses the actual project process once a graduate or intern arrives in a professional office. With the exception of professional practice courses (which typically are required under accreditation standards), the faculty members rarely broach process and timeline of a real-world project within the studio context. The values implicit in the current educational construct relate to the final product, not to the process by which it is created or will be built. Though the basics of structure, construction, etc., are covered in the curriculum, making the process secondary to product allows the student to gloss over seemingly minute decisions that also deserve deliberation and attention. The supporting belief is that public perception and emphasis is on the designed object, not on the process or factors upon which it was designed.

Product and process are both integral to the implementation of sustainability themes, as will be discussed in the data analysis. However, final studio projects (products) that are being emphasized are often looked at superficially, only in terms of aesthetics and form making. Sustainable design, on the other hand, looks to the final product in terms of
performance in addition to the aesthetic. To be considered a successful project in sustainability, both product and process need to be emphasized equally; an emphasis on one or the other could contribute to a barrier.

**The Architect as a Creative Icon:** Another pervasive cultural construct within architectural education is the architectural designer as creative genius. This construct is based on the belief that the architect can provide a service and expertise unlike any other. Such expertise represents primarily the aesthetic, with an understanding of built form, function, and the senses; it values the very notion of value itself, positioning the architect as an irreplaceable commodity within the design and construction industry.

A number of factors underpin the notion of the architect as a creative icon. Primarily they are: aesthetic emphasis, intensity of studio culture, and critiques.

1) Design assignments frequently emphasize design aesthetic and the final product instead of inclusive systems integration, even within comprehensive studios. This approach accentuates the importance of formal principles over problem solving or systems integration, which are typically covered in non-studio courses with diagrams, rules of thumb, and theory. Underlying these traditional assignments is the belief that inventive form is the ultimate commodity, thus reinforcing the essential value of the architect.

2) A second issue strongly related to the architect-as-icon is the intensity of the studio culture. Mind, body and spirit are each regularly tested in the development of the final design. History substantiates this culture as acceptable by tradition alone (as addressed later), and is seen as a rite of passage to receiving an architecture degree.
Such rigor is frequently one of the talking points mentioned when prospective students bring up the topic of teaching methods, illustrating its importance within the educational culture.

The premise of such practices is that the rigor of the studio strengthens the student and makes him/her ready for the trials found in the profession. It will be necessary for the designer to stand up in front of potential clients, peers, and others and self-assuredly state that their design meets the problem statement – and field any questions or concerns to the contrary. The value is on self-confidence, belief in individual design skills, determination, and confidence in their product.

3) Following the intensity of studio culture and architect as design icon are hyper-critical critiques. Historically, such critiques are viewed as harsh and unfriendly, though not at all institutions. While this practice is reputed to be declining, the custom itself has a long history in the field and should be mentioned. The exercise of insensitive critiques has been perceived as ultimately emphasizing the expertise of the faculty and panelists, and not the growth of the students. The value is on the development of personal strength, presentation, and communication.

With regard to sustainability, the Architect as Icon mentality can be seen as perpetuating the divide between “designers” and “non-designers,” which will be discussed later as a hindrance to the sustainability movement. By continuing to view the designer as a creative genius, opportunities for collaboration with other important team members could be marginalized.
**The Solitary Designer:** Architecture students routinely work alone, though on similar programs, and while they are in a community of other architectural students, their project process is a singular journey. Every decision is theirs and few compromises to other team members need to be made. Programs proliferate the idea of the singular architect without a team, consultants, or even a client. The premise is that the architect has the final say in design decisions, with ultimate control over the product at all levels. The value is placed on the substance of the final project, and on realizing the message that the designer had in mind.

In support of individual control is the absence of conflicting opinions and perspectives in courses. Traditionally, non-design perspectives are not readily included in the design studio. However, fully addressing sustainability requires in-depth conversations with differing viewpoints, often requiring resolution of competing priorities. Encapsulated designers and architects may claim a higher level of design expertise than non-design faculty with the intent of avoiding conflict, though there is serious doubt that the complexity of today’s problems can be solved by a single discipline. The importance of interdisciplinary design is discussed later, and is closely related to the idea of openness to alternate ideas and a willingness to engage in conflict outside the assumed area of design expertise.

2.7. **Environmental Rhetoric and Architectural Education**

To understand the complexities of architectural rhetoric and how it influences architectural education and the profession itself, two primary uses and foundations of the term must be reviewed. In both cases, the term *rhetoric* is used to indicate persuasive expressions, usually speaking or writing, that encourage the audience to sway or move in
some direction, or to identify with a cause. The term is also concerned with effective means of communication, both deliberate and unintentional. What is the speaker/author/educator/designer *trying* to say and *how* do they go about trying to say it? How are communication skills in design education being used to persuade, and to persuade to do what, exactly?

The difference between the two uses of the term comes with the additional nuances of the word. The first and most historical use of the term not only speaks to the persuasive intent of prose, but also emphasizes a connectedness to everyday life and larger themes, allowing the audience to more easily internalize and relate to the concerns of the author or speaker. The second use of “rhetoric” also focuses on the intent to be persuasive, but this more popular use is seen to employ empty phrases, notions and words. This definition is evident when groups or people proclaim one position but act differently.

Architects and designers have adapted and created their own uses of the word *rhetoric*. There are three primary styles of communication that are used in the field, each slightly different from the other: (1) communication between designer and client, (2) between architect and contractor, and (3) between professor and student. Understanding how each of these pairs communicates is fundamental to integrating environmental discourse into the field.

The first communication pairing deals with ‘dumbed down’ vocabulary, understanding that a client not in the field of architecture and design may not understand specific terms or popular theories in the profession. The second pairing is much more technical than a conversation among designers, or between students and faculty; contractors
typically have little interest in the theory or reasoning behind a set of construction documents. The third pairing, between student and faculty, is much more like a conversation of natives, using references, terms and theories that may be inappropriate in other settings. Given these differing approaches to common and frequent conversations within the field, the difficulty and nuances of overlaying a somewhat foreign subject such as environmental considerations must be explored. Just as the issues of design are discussed in various ways, sustainability and related themes also require various approaches to communication.

Yet another lens through which to look at a perspective on sustainability is architecture’s position between Art and Science. When asked what the field favors in its theories, methods, and critical perspectives, and depending on who exactly is being asked, the answer likely suggests that the field is a melding of the creativity of Art and the specificity of Science. Each, of course, has drastically different means of discourse and communication methods. In both situations, it is important to learn to communicate in the language of the field in order to take the desired place as a member of that community (Lemke 1990). As discussed previously in Section 2.3. Current Program Review, some programs lean toward a building science perspective while others more heavily emphasize design or ecological influences. These program variations illustrate the Art and Science divide and require different approaches, and different communication methods, to participate within the circles.

Even through non-verbal communication, it is through the creation of a building that an architect or designer communicates his/her perspective and philosophy to the masses, thus developing rhetoric to influence and speak to current users of the building, as well as future
generations. While relaying notions to future generations may be appropriate for monumental Architecture (with a capital “A”) such as Ronchamp or the Holocaust Memorial Museum, a similar effect also happens with other architecture (without the capital “A”), such as strip malls and big box stores; these commonly built forms may not leave messages we like for future generations. The less inspiring structures, like Wal-Mart, may not communicate powerfully, but they do, in fact, have something to say, and will continue to say it for decades, whether designers like it or not. In other words, all buildings “speak” to the public, whether the building is a strip mall or a signature skyscraper. This begs the question of intent within design communication, specifically regarding gestures to the environment.

The importance of persuasiveness within both the physical and graphically represented factors of design are not lost on faculty or students and frequently take the form of justification in final projects. At the end of the semester when the final designs are on the wall for review, it is not just the design itself that is being judged by the jury, but also the reasoning behind the design. What is communicated by the design and presentation, how is it being communicated and why is it being communicated? What are the core beliefs, the ‘big ideas’? And, of course, is the presentation communicating what the designer intended?

Though architecture is a highly subjective topic, final reviews (called critiques or crits) often take into account the reasoning and justification of both individual design elements as well as the design as a whole. An obvious question becomes: what is the educational process saying about how architects are addressing the environment? The incorporation of sustainability and green building themes into all levels of rhetoric is important when addressing holistic integration.
Another factor of communication and discussion regarding sustainability is the concerted effort of bringing discourse into the classroom, allowing for a conversation of the conflicting concerns regarding ecology. Of interest in this study is how to introduce conflict and allow for individual choice while developing and extracting ecological values within the design curriculum.

2.8. **Background Synthesis**

As noted in the above reviews, there are substantial overlaps in the topics of *Ecological Literacy in Design, Environmental Education Integration, Current Program Review, Curriculum Design and Assessment, Architectural Education Assessment*, and *Environmental Rhetoric and Architectural Education*. These overlaps concern issues of systems thinking and the scope of education; intentions behind the creation of course goals and big ideas; and the integration and evaluation of affective and intrinsic components as means to integrate core themes within courses and curriculum.

The thorough integration of sustainability and green building within architectural programs is a current gap in literature that this research begins to address. The field of architecture believes itself to be dichotomous in a number of ways, most predominantly speaking to both art and science. This trait can also be seen in the experiential and theoretical, intrinsic and extrinsic, and the aesthetic and practical. Such dichotomies may provide a number of possibilities to integrate green building and sustainability into architectural curricula.
This chapter first provides an overview of the theoretical perspective and conceptual framework for the study, followed by an outline of the initial research questions. As a larger worldview, this study is viewed from an interpretivist position. Adopting an interpretivist qualitative research approach, and emphasizing the self-reflective nature of how qualitative research is conducted, enables the researcher to make sense of - or interpret - the meanings that different architectural educators hold about the incorporation of sustainability in architectural education (Creswell 2007). While the term interpretivism is used periodically as a synonym for all qualitative inquiry, this study specifically uses the term with an understanding that “the meaning of human action is inherent in that action, and that the task of the inquirer is to unearth that meaning” (Schwandt 2007). Therefore, the awareness and appreciation of the subject, here architectural education, is just as important, if not more-so, than the found explanation of the subject of investigation (Charmaz 2006), in this case the integration of sustainability themes. Such interpretations allow the creation of a broad and rich description of architectural education and design culture itself, focusing on patterns and connections instead of causality (Charmaz 2006). The approach emphasizes how the participants make sense of their situations, illustrating patterns with which the entire design profession can identify.

3.1. Theoretical Perspective

Though originally developed by Glaser and Strauss (1967) as research that was to be free from prior notions and constructs, grounded theory has since been taken in different directions, allowing for the theoretical framing of inquiry. Others advocate for a social
constructivist perspective embracing and understanding diverse worlds, realities, and worldviews that are experienced by subjects (Charmaz 2006). As popularly understood, social construction is the creation of a particular group through common views and values. Through this type of inquiry, the goal is to explore how individuals and groups interact to create their perceived social constructs, thereby creating their social reality as the result of human choices.

Known as constructivist grounded theory (Creswell 2007), this approach is primarily interpretive, leaning heavily on the researcher’s perspective. Additionally, Charmaz (2006) places added emphasis on the subjects’ values, beliefs, feelings, and ideologies, rather than on the methods of research. In the realm of higher education, different groups and individuals can have vastly different criteria, such as an architect and a soil scientist; both have dramatically different spheres of interest and spheres of influence. Individuals in each field interact singularly, but within context, to create their own worlds. Through unending interactions, phenomena are established as pattern and tradition. Regarding sustainability, there is no established framework to which higher education or specific concentration programs must abide, or qualities that they possess.

Specifically referencing architectural education, the individual comprehension and acceptance of everyday reality is created and maintained by social interactions (Berger and Luckmann 1966). This study supports the position that the existing culture witnessed within architectural education is upheld by daily social interactions, placing the area of interest squarely within social constructivism. In other words, the participants understand what they know through a social context lens and group interactions.
Ontologically, this study is based in *relativism*, understanding that elements of a studied culture are dependent on other aspects of that same culture. Epistemologically, this study is based in *naturalistic inquiry*, understanding that the true and individual experience of faculty members in architectural programs are different depending on the individual, the context, the personal history, etc. The naturalist paradigm holds that realities are holistic, multiple, and constructed; all participants and contexts explored are continuously being modified (Lincoln and Guba 1985). Based on these characteristics, the study accepts the notion that there are a number of constructed realities and curriculum theories within professional architecture education, specific to both program and instructor, and seeks to understand commonalities and differences.

3.2. **Conceptual Framework**

The conceptual framework for the study can be seen in the diagram in Figure 4 below. This representation illustrates the larger framework outlined by Wiggins and McTighe (2005) in their *Understanding By Design* methodology in the three large boxes. Within the framework, the literature and topics previously reviewed are included: Sustainability Themes in Design Education, Environmental Education, Current Program Review, Curriculum Design and Assessment, Architectural Education Assessment, Cultures of Architectural Education, and Environmental Rhetoric and Architectural Education. It is posited that successful programs span effectively across these different realms of understanding, which in turn incorporate the different applicable topics. Specifically, the study explores where the individual methodologies fall within this spectrum and how the faculty engages this framework, illustrated by the lower yellow bar.
Another layer that is referenced in the research, but not included in the above diagram, is the notion of interdisciplinary themes. Because holistic sustainability is such a diverse topic, there is no possible way that it can be properly addressed within the realm of architecture alone; there is a host of other disciplines needed to sufficiently address the important issues.
While some of the potential partners are obvious, such as engineering and landscape design, others are equally important. These additional collaborators include business, natural resources, textiles, and policy as just a few. The discussion must be broad and inclusive, rather than narrow and exclusive. As previously noted, architecture programs tend to be compartmentalized, both through curricular criteria and the culture created by the field. The question brought forth in the interviews addresses the types of interactions that are important between fields, key people to be involved, and common threads that the proposed collaborations need to capitalize.

3.3. Research Questions

The primary research question of this study is:

**PQ:** What methods are being used to successfully incorporate sustainability and green building into architectural curricula?

This question explores the avenues of integration currently used in architectural education, and determines which are perceived to be most successful by the participants (instructors). Because of the strictly prescribed traditional course load, a specific area of attention becomes how non-traditional interest threads such as sustainability and green building themes are included.

The first subquestion is:

**SQ1:** How are courses structured that are seen as successful? What elements are necessary for a successful course? What type of instruction is most conducive to sustainability integration?
Another possibility is that smaller, critical thinking courses, such as specialized seminars, are more appropriate than those that are focused on sheer transmission of facts, such as structures and airflow. Course size may also be found to be a determinant of successful integration.

Similarly, what courses do instructors feel are most effective when integrating sustainability? Courses such as structures and environmental controls, which are based on mathematical calculations, may not be as productive as studio courses where building systems can be integrated and assessed for viability. On the other hand, a quantitatively focused course, such as environmental controls, may highlight tangible benefits and strategies. Given the differences, what are the “big ideas” identified by faculty members? What are their goals? Are they working toward a true understanding of the information as defined by Wiggins and McTighe (2005) by uncovering big, transferable ideas with enduring value? Such questions look toward the core intent of the course, and the guiding principles by which it is designed. This helps to illuminate the intentions of the instructor, as well as potentially touch on any affective and emotional content components that are of interest within courses. These questions also align with Wiggins and McTighe’s theories of content clarification.

The second subquestion is:

**SQ2:** What role does integrated and interdisciplinary design play in the implementation of sustainability in architectural education? How integrated do we have to be?

In other words, if integrated design is indeed a factor in sustainability, how do we ensure interdisciplinary design in academia? How do we get everyone to contribute? How integrated do the disciplines need to be? Which disciplines need to be involved in the conversation and
which are simply preferred? These questions not only addresses the mind set of the design field, but also the process of educating, levels of knowledge, and scaffolding courses. If it is integral, at what stage is interdisciplinary design introduced to the students? How much energy and time is invested in this method of education?

The third subquestion is:

**SQ3:** How are contested perspectives regarding sustainability addressed within the classroom? How are they addressed within the larger curriculum?

Ensuring that students have the critical ability to assess strategies pertaining to building systems, context and applications is imperative. This question also works in partnership with SQ2 above – namely, how do we incorporate interdisciplinary perspectives and potentially conflicting positions to work toward a sustainable goal?

The fourth subquestion addresses conversations the participants may have had.

**SQ4:** How are sustainability and green building themes discussed in courses and conversations within the college?

This line of questioning addresses the larger issues of rhetoric in the field, and how sustainability and green building are approached in the academy. Is the field viewed as a method of indoctrination, or is there an emphasis on critical thinking? This focus is also influenced by the interpretations of discussions and priorities in the workforce and how they trickle down into education.

The fifth subquestion addresses conversations how participants address issues of policy and legislation in the classroom, specifically regarding increased government interested in sustainability and energy.
SQ5: How is policy and legislation addressed in courses and conversations with faculty and students?

One realm that is not traditionally included in the architecture discussion is legislation and policy. With the increase in popular concern regarding energy use and environmental degradation, many are turning to legislation and policy for guidance regarding limits and regulations. The question then becomes, what does legislation affect within architectural design education, and how might it change the design and education process? Regulatory impacts come from the local, state or federal level, and are addressed through direct questions in the interviews.

The last subquestion explores perceived barriers of the integration.

SQ6: What are the biggest barriers to the integration of sustainability and green building into architectural courses and curriculum? Are they primarily within the specific program, the larger university structure, or both?

While listed last and not the primary goal of this study, this is an important question. Identifying possible barriers to sustainability and green building integration within architecture schools is key to success. Possible barriers may include established curriculum structure, required courses, or mindset of faculty. The subquestion also addresses the culture of architectural programs as reviewed in Section 2.6, and whether they help or hinder a shift in emphasis. By identifying these issues, the problem is given context and understood holistically, identifying what about the existing structures may support or hinder sustainability integration such as the setting, context or other conditions of the institution.
CHAPTER 4: Research Design and Methodology

This chapter looks at the methodological framework for the study, reviewing both qualitative research and more specifically the grounded theory approach. The overview is followed by the approach to data, including the population selection and sample size; the data collection methods, including interview procedures and protocols; the development of the research questions; the research question rationale; and the data analysis procedures. Next are the issues of quality standards such as verification, transferability and data reporting. The chapter closes with a subjectivity statement, ethical and political considerations involved with the study, and limitations to the study.

4.1. Background of Qualitative Approach

Though quite unlike the traditional hard science of quantitative methods, the qualitative approach to research has gained as much respect in recent history regarding rigor, application and findings. While the quantitative experimental method focuses on control and establishing cause, qualitative research studies objects in their natural settings accounting for context and every-day life (Groat and Wang 2002). Additionally, researchers focus on, looking at the object through the specific lens of the researcher while attempting to truly understand how the subjects are making sense of their own experiences (Ibid).

Often qualitative research uses a number of methods to collect data, allowing both a broader view and in-depth look simultaneously. Denzin and Lincoln (1998) call this multi-method approach “bricolage,” noting it as a “pieced-together, close-knit set of practices that provide solutions to a problem in a concrete situation.” (Denzin and Lincoln 1998; Groat and Wang 2002) Through this building block approach, the research process often becomes non-
linear; the traditional direct sequence of research design, to data collection, to analysis does not apply. Instead, the design, collection, and analysis happen iteratively and non-sequentially (Ibid). Data presentation also is an important part of the qualitative study, and typically involves narratives and verbal illustrations of the subjects, situations and context.

There are substantial strengths and weaknesses involved with the qualitative approach. The value in this strand of research lies in the ability to find deep understanding in real-life situations and settings through “thick descriptions.” (Groat and Wang 2002) There is also incredible flexibility to shift focus or collection methods, as new revelations are uncovered during the data gathering and analysis process. However, because of this flexibility and responsiveness to the specific situations being explored, there are no established procedures and protocols that are regularly followed, necessitating substantial creativity and adaptability from the researcher (Groat and Wang 2002). Additionally, researchers ascribing to the postpositivist paradigm frequently question the credibility of data acquired through qualitative methods. Because of the small sample sizes typical of qualitative studies, it is often difficult to generalize to populations, as the hard sciences intend; qualitative methods instead generalize to theories and theory development. Similarly, the interpretive aspect of qualitative research causes additional weaknesses because of the level of double-interpretation: the researcher interprets the response that the subject is interpreting from the natural setting or situation. To understand the complexity, nuances and immeasurables of integrating sustainability and green building themes into formal architectural coursework, a qualitative research method is employed.
4.2. Research Strategy: Grounded Theory

Because there is little research on the topic of design education, this dissertation aims to enable emergent theories pertaining to the integration of sustainability and green building themes within architectural curricula. With this in mind, the research approach that is adapted for this study is that of grounded theory. Grounded theory methodology focuses on the generation or discovery of a theory to develop a framework for further research (Strauss and Corbin 1998; Creswell 2007). The approach assumes “that all of the concepts pertaining to a given phenomenon have not yet been identified, at least not in this population and place. Or, if so, the relationships between the concepts are poorly understood or conceptually undeveloped” (Strauss and Corbin 1998). This situation, a void in understanding or research relating to specific phenomena, provides justification for the selection of methodology, and supplies fertile ground for the development of new theories through the grounded theory process.

Various strands of grounded theory have developed since its inception. The approach was initially developed by Glaser and Strauss in the 1960s as they researched the phenomenon of dying in hospitals (Glaser and Strauss 1965; Glaser and Strauss 1967). Interested in a specific phenomena they believed to be best suited for qualitative research methods, the partnership succeeded in moving traditional qualitative theory beyond strictly descriptive studies into the creation of theoretical frameworks constructed through abstract theoretical explanations of social processes, employing a constant comparative process (Charmaz 2006). In other words, Glaser and Strauss pulled away from the perceived fuzziness of qualitative inquiry and imposed structure on the qualitative research process,
formulating developed theories through research ground in traceable data; a structure was developed to guide qualitative inquiries. By overlaying rigor and established process onto the qualitative approach, Glaser and Strauss developed a research methodology in grounded theory that closely fit with the gathered data, was useful, had conceptual density, showed durability over time, was modifiable, and was explainable (Glaser and Strauss 1967; Glaser 1978; Glaser 1992; Charmaz 2006).

As the method developed and evolved, Glaser maintained consistency with the original principles of grounded theory, emphasizing discovery through data and the inclusion of basic social processes (Charmaz 2006). Strauss, however, partnered with Juliet Corbin, and moved away from the constant comparative method outlined in the original works with Glaser (Strauss 1987), thus creating different threads of the process. Glaser (1992) believes that Strauss and Corbin’s version of the grounded theory process, without the constant comparative method, forces gathered data into preconceived categories, conflicting with the foundations of grounded theory. Despite the conflict between Glaser’s version of grounded theory and Strauss and Corbin’s revisionist version, Strauss and Corbin’s iteration of grounded theory has developed into a formidable alternative (Charmaz 2006). As the evolution of grounded theory continues, an increasing population of researchers continue to modify and shift the tenets for grounded theory away from the positivism found in both Glaser’s and Strauss and Corbin’s versions, using the basic elements of grounded theory as a basis for developing new perspectives and methods.4 Researchers interested in grounded

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4 Most recently see Developing Grounded Theory: The Second Generation (Developing Qualitative Inquiry) by Janice M. Morse, Phyllis Noerager Stern, Juliet Corbin, Barbara Bowers, Kathy Charmaz and Adele E. Clarke, published in January, 2009.
theory can easily adapt the basic grounded theory guidelines of coding, memo-writing, sampling and the constant comparative method as a neutral foundation for exploration into phenomena of interest (Charmaz 2006).

Given the basic assumptions of grounded theory regarding the absence of substantial concepts pertaining to an area of interest (Strauss and Corbin 1998), the established research question for a grounded theory study clarifies the area of interest to be explored, situating the researcher within a framework of interest from which to start. The central phenomena of interest in this study are the experiences and perceptions of individual architectural faculty members as they strive to integrate sustainability and green building themes into their courses and curriculum. Methods of integration for these types of green building themes are under-represented in research and literature, as reviewed in the previous chapter. It is the intention of this study to elicit each participant’s individual perspectives surrounding this integration through in-depth interviews and personal narratives. The grounded theory process distills the perceptions of each participant, and the participant group as a whole, as gleaned through the interviews and narratives. Through the detailed comprehension of participants’ educational process, patterns of experience may be revealed for further insight.

Grounded theory researchers are commonly told to enter the field free of preconceived notions and motives (Groat and Wang 2002), though Charmaz (2006) advocates for a social constructivist perspective within grounded theory as previously reviewed and adopted by this study. This perspective would emphasize multiple realities and complexities of particular worlds (Creswell 2007). It is important to understand not only the direct experiences of the participants (instructors), but also to dig deeper and understand the
hidden networks, situations and relationships from their perspectives, in addition to emphasizing and understanding hierarchies, opportunities and communication (Creswell 2007). Because some of the lesser-discussed qualities of architectural education such as biases, leadership and tradition are being addressed, it is appropriate that it be based on a social constructivist theory.

Grounded theory also uses an iterative process, allowing the initial open-ended data collection to guide the process immediately following; the data collection, data analysis, and theory building are happening in unison (Groat and Wang 2002). Also integral to this process is the theoretical sampling of different situations to understand and synthesize the parallel similarities and differences (Creswell 2003).

4.3. Data: Participant Selection Process

In research there are generally two types of strategies for participant (or unit) selection: empirical or statistical strategy, or theoretical or purposive strategy (Schwandt 2007). The former is based primarily on representative selections of some population, while the latter focuses on relevance to the research question instead of population representation (Schwandt 2007). For grounded theory application, which focuses on the specific generation of a theory from specific and applicable participant insight, the investigator is best suited to select a participant sample based on their individual contribution to the development of a theory (Creswell 2007).

As noted above, however, while theoretical sampling and purposive sampling are often used interchangeably, some grounded theory researchers claim that there is a deliberate and important distinction (Bryant and Charmaz 2007). As noted by Charmaz (2007) through
an interview with grounded theorist Jane Hood, “Theoretical sampling is purposeful sampling but it’s purposeful sampling according to categories that one develops from one’s analysis and these categories are not based upon quotas; they’re based on theoretical concerns.” In other words, theoretical sampling is specifically to gather data to assist in filling out grounded theory research categories. However, with grounded theory studies the researcher does not know what the developed categories will become until initial data has been gathered. Therefore, initial and more generalized purposeful sampling must occur first.

This distinction aligns with the three stages of sampling as delineated by Strauss and Corbin (1998): initial sampling, relational and variational sampling, and discriminate sampling. These phases can also be referred to as open coding, axial coding and selective coding, which parallel the selection process (Creswell 2007). The goal of the first round of initial sampling is to begin to categorize and name phenomena, but without focusing to specifically on data gathering (Strauss and Corbin 1998). This process helps to create groups and general classifications that inform further data collection. Relational or variational sampling, as denoted in the second round of sampling, builds on the initial data gathered and seeks to establish “dimensional range or variation of a concept and the relationships among a concept” (Strauss and Corbin 1998). This second step aims to understand the full range and breadth of developing theories, allowing the researcher to begin to create boundaries and narrow the focus of the exploration. Discriminate sampling, the final stage, is a result of the selective coding process to take the final steps toward forming a theory, validate the relationships between developed concepts, and fill in any additional categories that are in
need of supplemental information (Strauss and Corbin 1998). This ultimately leads to category saturation and the end of sampling.

A purposeful sample was employed for the initial stage of this study, which included a number of faculty members within accredited architecture programs from around the United States reputed to be incorporating sustainability themes within their courses. Here purposeful sampling is used to work toward the development of concepts and theories, and is not focused on representing specific populations such as race, gender, age, etc. However, these categories were noted in the participant profile, along with information about their educational program and university, and were cross-referenced for additional findings, linkages and theory development. Initial intensity sampling allowed for the selection of specific individuals that are certain to contribute to the dialogue, who are participating in “information-rich” cases (Patton 2002). This is synonymous with initial, purposeful sampling.

The initial list of possible participants was created through the cross-referenced membership lists from two keystone organizations: the Society for Building Science Educators (SBSE) and the U.S. Green Building Council’s (USGBC) Formal Education Committee. Because there are not many organizations focused on the integration of sustainability and green building themes into architectural education, and the pool of involved faculty members is fairly shallow, these two organizations were referenced to capitalize on both involvement and expertise of participants. The populations of these leading organizations overlap, and served as the foundation for approaching participants. It is the researcher’s perspective that if participants are involved in either one or the other of the
organizations, they would be interested in discussing the area of interest; if the potential participants are involved in both groups, they are likely to be extensively invested in the issue and interested in talking about the subject in depth. This targeted process allowed purposeful selection of leaders of this marginalized movement for in depth interviews of their experiences regarding the integration of sustainability into their programs. These cross-referenced lists provided five names for initial contact. Because the potential participants were all likely to be very busy and have potential schedule conflicts, additional potential contacts were identified through participation on the SBSE email listserv with postings specifically referencing the integration of sustainability within formal architectural education.

The final list of potential participants included eighteen faculty members from different schools around North America. The first two interviews were held with two individuals on the initial selection list of five. As interviews were held, suggestions for additional interview participants were solicited from the participants. This allowed for further targeted sampling, specifically snowball or chain sampling, and was used as appropriate to supplement categories needing additional information or specific insight. Suggestions for additional participants mentioned at each interview were recorded and cross-referenced, and those potential participants with the most mentions were at the top of the list to be contacted as needed. A total of 49 potential subjects were identified; 12 were interviewed.

As research progressed, it was consistently suggested by interviewees that faculty members likely subscribing to an opposing perspective be included in the data gathering as negative-case data to help inform the theory development. Not only was this directly suggested by a number of interviewees, the development of themes referring to course
boundaries, specifically studio versus non-studio, and opposing design philosophies supported these requests for including a negative case. Negative cases are typically engaged in qualitative research for perspectives that may contest the theories developing from within the data. However, the selection of negative cases in this research is difficult due to the popularity of sustainability in both practice and academia. In other words, no faculty admit to not including these topics in their courses. Because the intention of the study is to explore specifically how sustainability themes are being integrated, the initial list of participants reputed to excel with the implementation of these themes remains the focus. However, one design studio faculty member was engaged in a conversation for supplementary insight specifically into design-oriented studio faculty perspectives.

Similarly, though not the direct focus of the current study, interviewing a leading green building practitioner was also suggested by participants to inform the research with a slightly different perspective. This provides a reference for the larger questions, such as what are the faculty members teaching, and how valued are these themes and applications within the leading green building philosophies. For this, one leading green building architect and sustainability consultant was interviewed and included in the participant list, for a total of twelve.

4.4. Sample Size

There is a continual question of sample size in qualitative studies since statistical significance is not applicable. Because this research looked at selected individual perspectives in-depth, a small sample size was based on time and resources. However, “small” can be debatable. As reviewed by Dr. Tuerê A. Bowles, grounded theory studies tend
to use between twelve and fifteen subjects in research; less than twelve may be too few and more than fifteen may become unmanageable (Bowles 2007). Others cite a preference of between twenty and thirty for grounded theory studies (Creswell 2007). Thomson also finds that, after reviewing fifty grounded theory articles from various disciplines between the years of 2002-2004, isolating those that concentrated on interviews and removing an outlier using a sample of 350, the average sample size was twenty-four (Thomson 2007). However, theoretical saturation is the final means of determining an appropriate sample size (Auerbach and Silverstein 2003).

Theoretical saturation occurs when no new categories, concepts, dimensions or incidents surface during the interview and data gathering process (Strauss and Corbin 1998). Because analysis is happening in tandem with data collection in grounded theory studies, data is recorded and analyzed between each interview. When new information ceases to appear in the newly gathered data, theoretical saturation has been achieved. Strauss & Corbin (1998) also suggest that the initial interviews may be used to help narrow the scope of the study and inform future interview direction. Focusing the direction of future interviews from initial conversations, in addition to other factors such as the experience of the researcher and the broadness of the question, can affect the final sample size. While Thomson (2007) finds that theoretical saturation typically occurs between 10 and 30 interviews, he suggests that a researcher should plan initially for thirty. Ultimately, however, the data must dictate the sample size (Thomson 2007).

Ten individual participants were interviewed from the original target population. Though ten participants was identified to be on the lower end of acceptable sample numbers,
the data indicated theoretical saturation. No new information was gained in the final two
target population participants, so interviews stopped with ten faculty. An additional two
interviews were added for varying viewpoints, resulting in a total of twelve interviews.

4.5. Data Collection Methods: Interview Procedures and Protocols

Because this study seeks to understand personal perspectives of the participants in
depth, not all data gathering methods are appropriate or as effective. Strauss and Corbin
(1998) distinguish interviews to be a critical method for obtaining valuable data in a
grounded theory study. Similarly, Charmaz (2007) underscores the importance of choosing
data collection methods that allow for the researcher to guide interests, sensitize concepts,
and follow up with expressed notions within the data; the interview structure allows for all of
these elements to occur seamlessly in the flow of discussion.

The data collection procedures are documented in Appendix A. In-depth, individual
interviews were the primary source of data, but were supplemented by various document
reviews as appropriate (journal articles, project outlines, curriculum structures, and syllabi).
The subjects were approached via email, and asked about their interest in participating
anonymously in the study. An email template can be found in Appendix B. A pilot
interview was also held, to assist the researcher in understanding issues surrounding in-depth
interviews and the process itself. Reflections of this can be found in Appendix C. The
resulting initial interview guide can be found in Appendix D, though the guide was modified
as the interviews progressed and served as a checklist of topics to remember during the
interview.
The interviews were conducted 1:1 in relaxed locations ranging from the faculty members’ offices to coffee houses. Two-thirds of the interviews were held in person, while the remaining discussions were held remotely via Skype. Holding some of the interviews remotely was necessary due to both time and financial constraints. Once the individuals agreed to participate, the North Carolina State University-approved research Consent Form was forwarded digitally for their review prior to the interview. Signed consent forms were either returned digitally (for remote interviews) or signed physically in person before the start of the discussion.

Interviews were approached as discussions or conversations to reduce potential anxiety for the interviewees. The questions and topics were shared only with one participant ahead of time, due to the time constraints of the actual interview schedule. The interviews started off with an overarching question relating to the participant’s perspective on sustainability within architectural education, either as they currently see it or how they would like to see it. This large question served as an appropriate framework to situate the discussion, and often led the participant into their own descriptions of methods that they prefer, have experienced, or would like to see. From there, the questions and discussion varied considerably as the following questions depended on the previous responses, resulting in a conversational meandering full of personal perspectives and experiences. As more interviews were completed, the follow up questions became more focused as concepts and theories began to take shape.

Each interview was digitally recorded with participants’ permission by two separate devices to ensure accuracy and to safeguard against technological mishaps. All recordings
were confidential and coded with interview numbers in lieu of participant names. Written short-hand notes were also taken during each interview for follow up questions, special comments of interest, or researcher’s thoughts. All documents and audio recordings, both primary and supporting, were stored on the researchers’ personal laptop and backed-up both on an external hard-drive and on a flash drive kept at the researcher’s private home. Audio files were transcribed by a third-party organization, reviewed by the researcher, and sent to the individual participants for their review to provide the option for clarification and additional comments.

In addition to the interview data and supporting documentation noted above, faculty position profiles were created to fully understand the level, status and contexts of the participants’ perspectives. An overview of the university structure was also compiled to incorporate the larger, external context of the program.

4.6. Data Analysis Procedures

As noted earlier, Strauss and Corbin outline three phases of coding analysis: open coding, axial coding and selective coding (1998); Creswell (2007) adds a fourth step in the creation of a matrix. First is the process of open coding where larger emergent categories are established to compile and organize emergent information. In other words, data from within the interviews is pulled apart to understand the essence of the narrative. The goal of open coding, as described by Strauss and Corbin (1998), is to dissect the data that is gathered and realign the pieces of information into associated groupings. “Conceptually similar” elements are arranged under theoretical umbrella concepts (Strauss and Corbin 1998). These categories came to host several subcategories, called properties, where diverse data can be
identified within the larger category (Creswell 2007), but still emphasize the continuity of the characteristics in the grouping. These developed categories then form a theory or construct.

The second stage, called *axial coding*, addresses the reforming of the data into a coherent whole (Charmaz 2006), and answers questions of the larger categories such as ‘when, where, why, who, how, and with what consequences” (Strauss and Corbin 1998). Some qualitative researchers cite the use of a logic diagram to identify central phenomenon, explore causal conditions, discover specific strategies, or delineate the possible consequences (Creswell 2007). Ultimately, the goal of axial coding is to organize the categories and subcategories through linkages into a framework for researchers to implement and apply to forming theories (Charmaz 2006).

The third stage of Strauss and Corbin’s (1998) data processing is *selective coding*, which provides analytic blending of subcategories and explanatory pieces surrounding a central category. In this third stage, a narrative may be created to connect different categories that have developed, or to connect statements about propositions or hypothesis concerning emergent relationships (Creswell 2007). The resulting concept provides explanatory power to the relationships that have been established thus far in the coding process, which reasonably and predictably explains the patterns that have been found within the data (Strauss and Corbin 1998).

Creswell’s (2007) final stage is the development of a *matrix* that clarifies found relationships between the economic, historical and social conditions that ultimately form the theory. This final step is a visual and quantitative account of the coding and theory development process. Strauss and Corbin (1998) also include a final phase to their selective
coding phase, which they call refining the theory. “Refining the theory consists of reviewing the scheme for internal consistency and for gaps in logic, filling in poorly developed categories and trimming excess ones, and validating the scheme” (Strauss and Corbin 1998). In this refinement process, all outliers and variations in the data should be incorporated or accounted for, or eliminated from the developed concepts.

Charmaz (2006) lists additional types of coding such as initial coding, word-by-word coding, line-by-line coding, incident-to-incident coding, in vivo coding, focused coding, and theoretical coding. While these have different names, they are primarily the same steps as identified by Creswell (2007), with additional detail or perspectives. These variations are illustrations of how different grounded theory researchers can use the basics of the method and modify the process to fit their research style or specific area of interest.

XSight software was used to analyze the data, creating categories and relationships. Word document files were imported as transcripts and coded at different levels.

4.7. Quality Standards: Validation, Transferability, Data Reporting

Member checking was the primary validation strategy employed in this study. Each of the participants was given the opportunity to review the interview transcripts and comment, adjust or approve the record of the discussion. It is very important to portray participants’ views accurately and appropriately within the discussion context. By offering approval through member checks from participants, the credibility and persuasiveness of the study is increased. Three participants of twelve responded to the proof-reading process with clarifications, comments or approval.
In tandem with the standard qualitative validation strategy of member checking, Glaser (1998) identifies four additional criteria from which to approach grounded theory studies in particular: *fit, relevance, workability,* and *modifiability.* Within these assessment strategies, the concept of *fit* addresses how formulated theoretical concepts from within the study suit the incidents that they represent, which is likewise related to how vigilantly the incidents and theory were put through iterations of cross-checking and comparison. The second concept, *relevance,* speaks to the involvement and investment of participants, guaranteeing that the study is not dry, or being accomplished solely as an academic exercise. The third concept, *workability,* proposes that a developed theory succeeds when it logically explains how the target problem is being addressed by the proposed theory, and that it accounts for different levels of variation within the gathered data. Lastly, a working *modifiable* theory has the ability to be altered when new data is brought into the scope of previously established data. As outlined through these four considerations, a grounded theory is never absolute, but the developed theory can fit the subject well, be relevant, be workable and be modified.

Charmaz (2006) provides four slightly different categories of criteria for assessing grounded theory studies: *credibility, originality, resonance,* and *usefulness* (182). *Credibility* combines Glaser’s categories of *fit* and *relevance,* focusing on the range of categories covered in the research, providing evidence for claims made, and iterative comparisons between the data and the findings. *Originality* speaks to the significance of the research, and whether the topic is new and broadens or develops current ideas. *Resonance* refers to relating the research to the needs of the field, drawing larger connections to other lives and
institutions as appropriate, and resounding with the participants and others in similar situations. Finally, usefulness speaks to the application of the findings in the daily lives of individuals, as well as contributing to the growing body of knowledge in the area.

This study worked toward Charmaz’s assessment criteria, focusing on credibility, originality, resonance, and usefulness. Regarding credibility, the range of categories covered in this exploration is broad yet appropriate, addressing issues from individual methods and projects within specific courses to larger issues pertaining to faculty bodies and university administration. The themes developed were brought back to the data and repeatedly reviewed, as evidenced by the process outlined in Section 4.6. Data Analysis Procedures and in Chapter 5: Findings. The issue of integrating sustainability themes into architectural education is a topic of concern in the educational realm, yet the literature addressing the topic is sparse. Given this background, the topic achieves originality, developing and broadening ideas of interest. As the findings of this study are increasingly discussed, the issue of sustainability integration is of great interest to other faculty members in both the architecture field and related fields; difficulties and methods expressed in the findings ring true with faculty at other institutions. This response ensures that this exploration relates to the needs of the field, realizes connections to other fields and institutions not included in the study, and achieves resonance. Finally, the findings are useful to the daily lives of architectural educators interested in sustainability integration at a number of levels, while contributing to the increasing body of knowledge on the topic.
4.8. Subjectivity Statement

The influence of the researcher themselves is an important element to take into consideration in a qualitative study, particularly with a grounded theory methodology where there is no existing basis for the development of theories. Strauss and Corbin (1998) address this issue, stating that, “Objectivity is necessary to arrive at an impartial and accurate interpretation of events. Sensitivity is required to perceive the subtle nuances and meanings in data and to recognize the connections between concepts” (43). This section crafts a short researcher biography with the intent of identifying and understanding potential biases, intentions, and sensitivities have influenced this study.

My primary reason for pursuing a Ph.D. is to better understand, and therefore combat, the challenges encountered with integrating sustainable design and green building themes in formal architecture education. This is an interest that has been with me even before I was aware of it, and can be seen repeatedly in my history. My subjectivity is affected by four primary elements: my family background, my potentially opposing political views, my undergraduate experience, and my professional experience in the architecture field.

My childhood is based in small-town mid-America. My parents were both from a town of less than 500 people and were immersed in the frugality of the time. Everyone grew their own vegetables, and knew where meat was butchered and who had tended the herd. There was no room for waste, which translates directly into the modern day notion of sustainability. Even the passive design of barns and farmhouses tread lightly on the land, reserving environmental and financial resources for other necessities. Though I was not
immediately a product of farm life, the values trickled down; we did compost and have a sizable garden to cultivate our own land ethic (which I did not embrace at the time).

I am increasingly aware of a conflict between my need to protect the environment and what would be traditionally viewed as conservative farming roots. While there are definitely aspects of sustainability within the farming culture, there are also a number of anti-environmental practices that have resulted: the use of DDT, overgrazing land, mismanaged crop rotation, deforestation, and species extinction. I am also a believer in personal responsibility and have yet to fully understand how personal responsibility and personal rights might be married to the protection of the greater environment.

I received my professional undergraduate architecture degree from the University of Cincinnati in 2000, and immediately went into the workforce. I had already completed two years of internships while in school; during this time I rarely thought about sustainability within my projects. My senior thesis project – a therapeutic horseback riding facility for mentally and emotionally abused youth – addressed passive strategies that would now be deemed ‘sustainable.’ While my project incorporated passive strategies and local materials and design, my instructors seemed fairly ambivalent about the sustainable aspects of any project, not acknowledging them or identifying them in anyway. In retrospect, faculty may not have felt that it needed mentioning specifically. I view this final senior project as successful on all counts and was given an Honorable Mention Design Award from the Cincinnati Chapter of the American Institute of Architects.

After completing my undergraduate degree I went to work for one of the largest architecture firms in the world. Sustainability was still not something that I actively pursued,
even then; the term was not as popular as it is now. However, if something came up in the office about green design, I immediately vocalized my interest. When the corporate office began to form “green teams” at each of the offices, I became deeply involved and a leader in the movement in our local office. However, I found substantial resistance from senior staff in different departments and at that point decided to return to school for a graduate degree to help develop arguments of persuasion.

Because of these developmental elements of my persona, I understand that I am biased against the established culture of the design firm, which I see as stagnant and in desperate need of change. I believe design culture itself to be quirky and stubborn, not easily subject to shifting paradigms. I am also suspicious of some architecture programs, because they are propagating the environmental issues of concern in the field. And I understand what it is like to be interested in something with no source of information.

4.9. Ethical and Political Considerations

There are a number of ethical considerations to be aware of when undertaking this study. It is very important to be aware of the tradition and pride seen in architecture departments, and take care to not step on toes or have groups close ranks. It is also very important to keep the participants anonymous and safe because, while boat rocking is frequent in academia, too much rocking is not advisable.

Political considerations include the politics of the different individual architecture programs and the larger architectural educational realm. Policy bodies that would be considered include the American Institute of Architects (AIA), the Association of Collegiate Schools of Architecture (ACSA), the National Architectural Accrediting Board (NAAB), and
the National Council of Architectural Registration Boards (NCARB). However, it is not anticipated that participation in or exposure to this study would cause conflict for any of these organizations.

4.10. Limitations to the Study

There are both advantages and limitations to this study. The development of a new substantive-level theory can ultimately be tested within the field, giving the study both credence and practical application. Within the grounded theory process, qualitative methods are blended with a hint of quantitative structure in the framework development process (Charmaz 2006). This combination can be attractive to individuals who favor both hard science and the intangible, as embodied in the architectural profession. Additionally, this new theory is generalizable as theory across different architecture curricula for implementation as the specific program sees fit, and possibly to other neighboring design fields and complementing professions. The findings may also be transferable to issues regarding the implementation and integration of sustainability and green building methods into design and construction’s professional culture.

One limitation of the study is the complexity of the process. As stated by Glaser (1998), "Grounded theory is multivariate. It happens sequentially, subsequently, simultaneously, serendipitously, and scheduled." Gathering, coordination and analysis of these diverse elements is difficult, time consuming and highly variable. Creswell (2007) calls it a zig-zag process, though also seen as cyclical and without a definitive end. According to Charmaz (2006), the process is always incomplete and inconclusive. Additionally, this study
has a relatively small sample size targeting between twelve and fifteen instructors, which could lessen the generalizability of the findings.

4.11. Methodology Summary

In summary, this research followed the general guidelines of grounded theory as laid out by Strauss and Corbin (1997), with modifications from other qualitative researchers such as Charmaz (2007) or Creswell (2008), as noted. The primary data was collected through in-depth interviews in narrative form, supplemented by additional documentation and profiles as appropriate. Data analysis was completed through the use of XSight software, adhering to the three-tiered coding guidelines of Strauss and Corbin (1997). A number of validation methods were implemented as recommended by different grounded theorists such as Glaser (1998) and Charmaz (2007).
CHAPTER 5: Findings

This study focuses on one central research question: How are sustainability themes being successfully incorporated into architectural curriculum? Through the purposeful and theoretical sampling and in-depth interview process, rich and descriptive data was gathered to inform the complex issue of the integration of sustainability with architectural education. The analysis of the gathered data results in themed categories and clustered data applicable to the central research question and the initially outlined sub-research questions. Because the field of appropriate participants is small, an initial list of eighteen potential contributors was established as a purposeful sample. As the interview process unfolded, the list was modified due to the availability of targeted participants in combination with their suggestions for additional participants, gathered in each of the early interviews. The final sample consisted of ten faculty interviews with an additional and unexpected two interviews: one of a professional in sustainable design, and one studio faculty member holding alternative design philosophies.

The interviews were conducted primarily over a ten-week period. As reviewed in the previous chapter on methodology, the data gathered is predominantly in the form of narratives. Very few questions posed by the researcher were answered with a short response. Within this chapter, the data is analyzed and presented through thick descriptions in narrative form with direct quotations used for additional insight into the participants’ thoughts and perspectives as appropriate. Though the participants are all likely to be familiar with each other, and suggestions were taken for additional interview subjects, the participants and their programs are confidential, so consistent pseudonyms are used throughout the analysis and
discussion of findings. Through this consistent reference, direct quotations and interpretations of the discussions with the different individual participants can be linked accurately to the correct sources in the transcripts. As noted in the methodology section, the interviews were recorded digitally and transcribed by a third-party service before the participants were given a chance to review the content, all to maintain accuracy and the intention of quotes, words, context and thought processes.

Issues of confidentiality are stated as an integral part of the established study framework and are included in the consent form that each participant signed. However, due to the common goals of the sustainability movement and the liberal sharing that occurs regarding educational methods within a small and familiar group, many participants do not echo the importance of anonymity within the group. There were instances, however, when participants were speaking about issues relating specifically to their programs or about other programs, when their body language and tone reflected slight discomfort with who might potentially overhear the conversation. In one instance Larry, an instructor at an urban program, specifically asked that the recording be paused, “We’re in a political situation right now. You have to turn that off for me to talk about it.” Another participant, Ava, put her hand over the recorder at one time to shield the microphone from picking up only a few words on her thoughts about other faculty. And still another participant, Peter, after a dialogue reflecting on the characters of different programs, motioned to the recorder, saying, “You’d better be careful….” This insinuation was that his name should not be tied publicly to the descriptions he had just provided of various programs. These actions, though few, are in direct conflict with the overall air of openness throughout the interviews; this represents an
additional lens of professional conduct and respect for different elements of different programs, and not so much a need for secrecy. These actions also illustrate a level of comfort with the researcher through trust and openness with personal thoughts. These glimpses are taken into account as necessary in the analysis and descriptions that follow.

It should also be noted that nearly all of the participants comment specifically that the topic is an important one, and that they feel any insight gained from this study will be beneficial to the field. The majority also thanked the researcher specifically for posing the question and for providing the opportunity to talk about a topic that is so important to them and which often does not receive much attention. Larry mentions, “I like this. I get to spout off educational theory for an hour and somebody actually wants to listen.” This general gratitude was not always as forthright, but there was a feeling of camaraderie within each interview, as if the participants understood that the two individuals having the discussion (the participant and the researcher) are on the ‘same team.’ The harmonious nature of the interactions contributed to the comfort level of the participants and resulted in insights that may not have been shared otherwise.

As outlined in the previous chapter, the data gathering process employs a constant comparative analysis. The beginning of this process is referred to as initial coding, or open coding, as outlined by Strauss and Corbin (1998). This process includes the identification of emergent themes, categories and concepts; an analysis of the linkages and themes within those concepts; and indicates initially identified themes for additional data collection. After determining the primary categories, the data analysis moves into the axial coding stage. Here subcategories, properties and dimensions of data are analyzed to begin to link independent
interactions and conditions of the data within various contexts to the primary categories and themes. The third and final phase, selective coding, enables the data to fill out the found categories and complex relationships to create an explanatory concept that takes into account the full range of considerations surrounding the issue (Strauss and Corbin 1998).

Data gathered in this research is complex and dense with narrative information and personal experiences. As the initial interviews are reviewed and coded for major themes, a high level of commonality emerges regarding the basic criteria and methods that the participants used in teaching and integrating sustainable and green building themes within architectural education. However, there is variability in personal experiences, factors, and feelings that are seen in partnership with these methods. As outlined by Strauss and Corbin (1998), the interview process and sampling is adjusted as needed on the “basis of emerging concepts.” In other words, participant selection is modified if alternative subjects are seen to be more appropriate, and the interview outline is also altered to reflect specific issues that developed. Primary and consistent themes emerge in the first four interviews. Throughout the analysis, the primary themes that emerge and are supported include Cross-Campus Integration, Culture and Tradition, Framework Development, Student Activities, Faculty Involvement, and Integrated Curriculum. Given this emergence of initial themes found during open coding, detailed axial coding is conducted in light of the six categories. Based on the complexity and depth of the data gathered throughout the analysis, the researcher does not feel that it is possible to reduce the number of primary categories found and analyzed.

Personal and institutional information was gathered on each of the participants and their programs to provide additional insight and context around the emergent themes. Table 1
outlines the general biographical and situational information about each participant as identified by their pseudonyms. The information includes individual information such as gender, teaching/faculty position, total years teaching, and years at current program. Table 2 outlines information relating to their architectural programs such as if it is structured as a college or school, the size of the program, and other programs offered under the same umbrella. Table 3 provides a brief university profile including the size and context of the university.

Table 1: Participant biographical information

<table>
<thead>
<tr>
<th>Name</th>
<th>Teach Studio?</th>
<th>M/F</th>
<th>Position</th>
<th>Total Years Teaching</th>
<th>Years at Current Program</th>
<th>Typical Courses Taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baxter</td>
<td>y</td>
<td>M</td>
<td>Prof.</td>
<td>41</td>
<td>36</td>
<td>Studio, ECS</td>
</tr>
<tr>
<td>Jared</td>
<td>y</td>
<td>M</td>
<td>Asst Prof w/ Tenure</td>
<td>20</td>
<td>17</td>
<td>Studio, Theory, ECS, Professional Practice</td>
</tr>
<tr>
<td>Ned</td>
<td>n</td>
<td>M</td>
<td>Emeritus</td>
<td>36</td>
<td>36</td>
<td>ECS, History, HVAC, Structures</td>
</tr>
<tr>
<td>Peter</td>
<td>y</td>
<td>M</td>
<td>Assoc. Prof</td>
<td>41</td>
<td>5</td>
<td>Studio, Design-Build, Sustainability</td>
</tr>
<tr>
<td>Larry</td>
<td>n</td>
<td>M</td>
<td>Assoc. Prof</td>
<td>29</td>
<td>29</td>
<td>ECS, Research Methods</td>
</tr>
<tr>
<td>Paul</td>
<td>y</td>
<td>M</td>
<td>Assoc. Prof</td>
<td>18</td>
<td>7</td>
<td>Studio, ECS, Sustainability</td>
</tr>
<tr>
<td>Barry</td>
<td>y</td>
<td>M</td>
<td>Prof.</td>
<td>30</td>
<td>18</td>
<td>Studio, Design-Build, ECS, Energy</td>
</tr>
<tr>
<td>Michelle</td>
<td>y</td>
<td>F</td>
<td>Prof.</td>
<td>18</td>
<td>18</td>
<td>Studio, Design-Build, ECS</td>
</tr>
<tr>
<td>Ava</td>
<td>y</td>
<td>F</td>
<td>Prof.</td>
<td>20</td>
<td>12</td>
<td>Studio, ECS, Research Methods, Sustainability</td>
</tr>
<tr>
<td>Henry</td>
<td>y</td>
<td>M</td>
<td>Prof.</td>
<td>23</td>
<td>18</td>
<td>ECS, Renewables, Passive Systems, Sustainability</td>
</tr>
<tr>
<td>Derrick</td>
<td>y</td>
<td>M</td>
<td>Lecturer</td>
<td>10</td>
<td></td>
<td>Studio</td>
</tr>
<tr>
<td>Ryan</td>
<td>N/A</td>
<td>M</td>
<td>Professional</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Table 2: Program profiles

<table>
<thead>
<tr>
<th>Name</th>
<th>College / School</th>
<th>Undergrad &amp; Grad Population</th>
<th>Degrees Offered</th>
<th>Other Programs In Same College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baxter</td>
<td>C</td>
<td>~ 410 (arch only)</td>
<td>X</td>
<td>Planning, Landscape, Historic Pres.</td>
</tr>
<tr>
<td>Jared</td>
<td>S</td>
<td>~ 770 (arch only)</td>
<td>X</td>
<td>Planning</td>
</tr>
<tr>
<td>Ned</td>
<td>C</td>
<td>~ 1465 (college)</td>
<td>X</td>
<td>Interior Arch, Graphic/Indus. Design, Bldg Science, Construction, Landscape, Planning</td>
</tr>
<tr>
<td>Peter</td>
<td>C</td>
<td>~ 1825 (college)</td>
<td>X</td>
<td>Planning, Construction, Landscape</td>
</tr>
<tr>
<td>Larry</td>
<td>C</td>
<td>~ 755 (arch only)</td>
<td>X X X</td>
<td>Industrial Design, Design Build, Interior Arch</td>
</tr>
<tr>
<td>Paul</td>
<td>C</td>
<td>~ 125 (arch only)</td>
<td>X X</td>
<td>Env. Design</td>
</tr>
<tr>
<td>Barry</td>
<td>C</td>
<td>~ 835 (college)</td>
<td>X</td>
<td>Interior Design, Art, Design, Landscape</td>
</tr>
<tr>
<td>Michelle</td>
<td>C</td>
<td>~ 1880 (college)</td>
<td>X</td>
<td>Arch. Engineering, Planning, Construction Mgmt, Landscape</td>
</tr>
<tr>
<td>Ava</td>
<td>S</td>
<td>~ 619 (arch/interiors)</td>
<td>X X</td>
<td>Interior Arch., Art, Landscape, Planning, Policy, Historic Pres., Design</td>
</tr>
<tr>
<td>Henry</td>
<td>C</td>
<td>~ 935 (arch/landscape)</td>
<td>X</td>
<td>Landscape, Art, Media, Dance, Design, Music, Theater</td>
</tr>
</tbody>
</table>

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As Table 1 shows, only two participants are female. Though other females are identified, the scheduling was complex and interviews could not be completed in a timely manner.

However, because the purposeful and theoretical sampling does not intend to secure a representative selection, this is not seen as an issue.

In moving on to data analysis, it is necessary to reiterate that the data collected during the research process is reflective of the positions and views of the participants. The statements collected are framed as participants chose, and often the context of the initial question is shifted by the participants themselves to individualize and clarify their thoughts and perspectives. The linkages and generalizations made by the researcher based on the
commonalities found within the data can only apply specifically to the study participants included as individuals, but can be generalized to a theory for further research and testing.

While these larger themes are explored and integrated to a cohesive theory and approach in Chapter 6: Discussion, this chapter first addresses the information gathered in the various coding phases, followed by an analysis of the data and findings in direct relation to the central research question and subcategories. Due to the interconnectivity of the different categories, categories often overlap and reference similar data.

**5.1. Open Coding: Understanding the Context**

In line with the analysis method outlined by Strauss and Corbin (1998), the open coding process uses in-depth questioning through interviews, followed by repetitive analysis and comparison of the data being gathered. The information that emerges during the initial interviews is gathered and pulled apart for better understanding, then re-compiled into related groupings to create a series of larger categories. These categories are explained by the properties and attributes of the category itself, as well as the range of dimensions between each experience within the properties (Strauss and Corbin 1998). The initial open coding process explores the categories found, and the properties and dimensions within each of these categories. In the following analysis, tables are provided to summarize the data, supporting the narrative from the interviews that creates the thick description of the developing themes. Quotations are provided in support of these categories and themes as applicable.

The first category to be analyzed is *Cross-Campus Involvement*. 
5.1.1. Cross-Campus Involvement

Table 4 illustrates the properties and their dimensions that emerged within this developing category.

Table 4: Category 1: Cross-campus Involvement

<table>
<thead>
<tr>
<th>Property</th>
<th>Dimensional Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdisciplinary Themes</td>
<td>Within college, outside college, ivory towers, industry</td>
</tr>
<tr>
<td>University Courses</td>
<td>General education, certificates, research centers</td>
</tr>
<tr>
<td>Campus Initiatives</td>
<td>Programs, conferences, student activities, facilities</td>
</tr>
<tr>
<td>Roles</td>
<td>Educator, leader, activist</td>
</tr>
</tbody>
</table>

Descriptive narratives and quotations from the interviews support these categories. The emergent issues from the data are explored and reviewed in terms of the properties and their dimensions. As ordered in Table 4, the property of Interdisciplinary Themes is addressed first.

Interdisciplinary Themes

Participants agree that the integration of sustainability themes across the campus has the potential to impact their architectural programs in different ways. In a direct question from the interview guide, all participants are asked about their interest and views on interdisciplinary work. All participants feel that interdisciplinary work is essential to a successful design in practice, but the extent and methods of bringing in other disciplines to the classroom are valued in differing degrees. As Baxter said, “I think the collaboration piece is critical, because that’s the working world.”
Some schools are structured with a common first year program in the college, where all incoming freshmen take the same courses. Instruction during this year provides foundational courses and information that is helpful to all disciplines as they move forward, and these introductory years are often viewed as interdisciplinary work. While this type of structure does provide exposure to the breadth of other concentrations such as planning, landscape design, graphic design, interior design, etc., these courses do not address the level and depth of interdisciplinary work that is needed to forward sustainability themes.

Paul finds it best in his experience with undergraduate students to bring in experts for short bursts of exposure, then allow the students to role-play in groups to simulate the different positions present on a project. “One of them is the owner, another one is the developer, another one is the architect, another one is the mechanical engineer and so and so. They have to use these roles to work out a project.”

This substitution is not ideal, but Paul finds it the most viable approach thus far. His experience with extended participation in courses from students in other departments on campus has been frustrating and time consuming. “I think it is difficult. It would be a good idea, but in ten weeks it is difficult to do too much of this. It’s just too difficult to arrange, and in our university [students] would need to be given time from their department to participate in studio.” Incorporating other students who are not familiar with the studio culture, structure and demands is, in Paul’s perspective, too much effort for the return given.

Baxter echoes Paul’s concerns about involving other disciplines in the studio setting. “It would be difficult if you brought in someone out of any other discipline, whatever it was, and asked them to come in and mimic the studio culture experience.” For Baxter, this
disconnect includes not only students who would need to participate in the studio course, but also the faculty who would help to run the course. “Not only is a 4-hour block a headache for the uninitiated other discipline, but it’s also the case that the visiting faculty probably doesn’t know much about the critique process, and how to set up a crit so that it’s useful for the students.” As a long-standing faculty at a large town program, Baxter feels strongly that sustainability themes need to be included in the curriculum, but that they can be addressed primarily from within the college, bringing in other experts regularly to provide “bite-sized exposure to students.” He also feels that there are two roles that visiting experts can play: “There would have to be a distinction made between bringing others in for information’s sake and bringing others in for contribution’s sake.”

Some participants manipulate the constraints on their campus to allow and support interdisciplinary work. Barry says, “We’ve been experimenting, and notably we’ve been experimenting in the studio with processes toward getting good interdisciplinary integration, and one of the things that you realize when you try to do this is that sustainability is not just an architectural problem.” As a faculty member in the same program for over 20 years, Barry tries to integrate sustainability in various ways and believes that the best way to create a true understanding of sustainability issues is to provide interdisciplinary opportunities. “For a number of years, we’ve been doing integrated practice projects in the studio where we link up with students in other disciplines to solve or attack the problems.” The syllabus is included in Appendix F. His initial efforts included other disciplines within the same college, such as interior design and landscape design, but eventually he expanded it to incorporate other programs on campus, such as engineering and environmental science. For Barry, the
execution of studios at this high level of integration is very successful and fulfilling, winning recognition at the national level. He believes that student learning is multiplied, as each student describes and defends the strategies of the other disciplines. “The landscape architect presents the architecture, the interior designer presents the landscape, and the architect presents the interiors.” These projects are also seen as successful on campus, and are now a staple in the program offerings, moving into the direction of design-build.

The role of industry is not regularly included as content in architectural curriculum, though the issue of industry integration did appear repeatedly in the interviews. One participant, Peter, is especially interested in the students’ exposure to the integration of industry. His enthusiasm for industry involvement is based in engaging the students in projects that are real and able to be implemented, and that hold the added possibility of research credit, revenue, interdisciplinary work, and contributions to change in the marketplace. As he says, “You have actual ways to implement something meaningful somewhere in the world.”

Because of his experiences in higher education involving traditional studio structures and project-based learning, both in architecture and in other disciplines, Peter now prefers that his methods with students include real-world projects. By engaging the students in projects that can be implemented, “you’ve got to deal with the damn energy people, the damn engineers, the damn architects, the damn landscape architect, and it has to come out working.” For Peter, the industry approach embodies the pragmatism of designing and constructing solutions that work, can be produced, and can be implemented. He believes
strongly that the theoretical design exercises commonly found in studio courses are effectively useless, not affecting anything of any consequence, and are strictly academic.

Others, like Michelle, agree that involvement with industry is important to the development of future professionals, but also feels that there are limits and boundaries to observe. “I think it’s important, but I also think it has to be done judiciously because we have academic goals.” In other words, involvement with the real world is important, but educators need to ensure that the education itself is not compromised; Michelle is talking about the responsibility she feels for her students to receive a solid foundation of knowledge, which must be a precursor to exposure to real world, industry issues.

There is also a difference in perception among participants regarding the term “industry” itself. As seen above, Peter associates the word with fabrication and standards, while Michelle understands the term to mean architecture and construction as an industry on its own. Regardless of the specifics of the terminology, most participants agree that involving students in real-world problems actively engages additional skills such as problem solving and team building, which are not explored as deeply in studio.

*University Courses*

When beginning to look at larger, interdisciplinary themes that can provide an overarching, holistic perspective for architecture students, Michelle, a faculty member at a small rural school on the west coast, brings up the notion of *general education courses*. “If these problems that we’re facing are so encompassing, is there potential for general education courses to have a great impact on the way we see buildings?” As a long-term faculty member in architecture, Michelle’s personal interest is in the understanding and collaboration
between seemingly disparate subjects, and in creating a larger common ground as a sustainability foundation. “I’m interested in that mutual relationship where architecture can impact general education and the sustainability arena and all their different perspectives could impact our architecture student thinking.” She summarizes by saying, “Are we at the point where the profile of sustainability has to be higher [than individual disciplines] and it does need to be institutionalized? I don’t know how we’re going to get there otherwise.”

Campus Initiatives

As noted in Chapter 2, relating to background and cultural issues within architectural education, architecture students are often isolated within their program and not regularly involved with additional activities, either in their school or elsewhere on campus. Participants indicate, however, that their students are notably involved in initiatives on campus. Barry shared how the students on his campus feel sustainability to be a substantial issue, so “they taxed themselves to support a student-run sustainability center on campus. The current president of that campus-wide group is an architecture graduate student.”

Research centers on campus, while not a regular feature, are seen as another way for students to get involved with larger, interdisciplinary, real-world campus initiatives. Primarily faculty members, the leadership groups at many of these research centers on college and university campuses are diverse, and often connected to initiatives outside the university. When students become involved, as Michelle says, they “become members of the club” gaining practical experience, understanding established problems and potential solutions, and creating a network of knowledge and contacts to reference as they move forward.
Roles

The conversation regarding the roles of an architect straddles the line between the professional realm and the academic realm. Many participants indicated that architects should be seen and should position themselves as educators, leaders and activists, regardless of their official title and responsibilities (university or profession). When questioned about the role of a professional architect, inquiring about what role(s) students should be preparing for, the question often needed clarification; the researcher followed with any number of examples: educator, activist, generalist, specialist, leader, resource, etc. The response from the participants was often “all of the above.” This part of the conversation with each participant was always short and succinct, as though it was strange to even pose the question; the common view is that, of course, the profession impacts and is responsible on these various fronts.

5.1.2. Culture and Tradition

Table 5 illustrates the properties and dimensions found within Culture and Tradition as a developing category.

<table>
<thead>
<tr>
<th>Culture and Tradition</th>
<th>Property</th>
<th>Dimensional Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical Methods &amp;</td>
<td>Educational Approach</td>
<td>Studio, tradition, general issues, criteria</td>
</tr>
<tr>
<td>Competing Paradigms</td>
<td></td>
<td>Theoretical basis, value-making</td>
</tr>
<tr>
<td>Responsibility</td>
<td></td>
<td>Understanding, shirking, passing, ambivalence, greenwashing</td>
</tr>
</tbody>
</table>
Historical Methods and Educational Approach

As the overarching and most obvious roadmap for the education of future architects, curriculum is often the first area that comes to mind when asked about issues in architectural education. The curriculum provides structure and serves as a touchstone for faculty at all stages of their careers, creating a framework within which to develop their individual educational methods. Within architecture, the curriculum is fairly rigorous, without much room for individualization and modification; to some faculty, this rigor can seem stifling.

There are also elements within architectural education, such as studio courses, that form the backbone of the education and are a core element of the education process, but the notion of which is alien to others outside of the field. As Ned points out, “If you [haven’t] gone through architectural education, you don’t really understand studio and the culture.”

There was a widespread feeling among the participants about how architecture exists and is taught. Ned says, “Architecture is always explained as an art that got its inspiration from symbolism and abstract ideas. And in effect, you can lie very much by omission.” He explains his feelings: “Architecture, the way it has been taught, was teaching only a small part of where buildings came from. And the other parts were ignored, which means the students focused only on the part that was taught.” In his view, students were only taught about form and symbolism. A retired faculty of many years in a large, rural, southern program, Ned has been shaped by his experience of finding repeated emphasis on form and sculpture in architectural education in the endless number of programs that he has visited.

Ned also maintains a philosophy about what he calls the indoctrination of architecture students. “The students are kept in studios so much that they have very little
contact with the other students. And what is the basic strategy of a religion [but] to promote itself? Keep the people close…. Eventually you buy in, and if you become architectural faculty, what you do is teach the same philosophy.” Having very powerful experiences as an advocate of a sustainability philosophy that was not readily accepted, Ned admits to spending much time thinking about how and why the culture of design exists as it does, and feels that his illustration paralleling a religious structure is most appropriate. As to why alternative belief systems such as sustainability have such a difficult time taking hold, Ned says, “It’s because of the indoctrination. It’s so powerful that contradictions and alternate thoughts can be ignored.”

Larry has also developed a solid position on the power of the culture in architecture schools, specifically surrounding studio. As a faculty member and witness to the execution of studio within a design-oriented program, Larry also feels that alternative paradigms are extremely difficult to incorporate into the established design culture. “Culture is our shared values and experiences,” he says. With architecture, the most dominant constant is the studio and, thereby, it defines the culture. Through this emphasis, Larry believes that students develop their self-image, in part, from their participation and performance in studio. “They came into school with an ‘I’m a star artist’ and as long as you get As and Bs in studio you maintain your self-image, and you buy into all the star designer mania; you also accept the isolationism and the other negative aspects of studio.” The common belief is that there is a very strong, very real culture developed in architecture programs, primarily through the studio courses.
Competing Paradigms

Participants commonly feel there to be conflicting paradigms within architectural curricula, in studio in particular. In other words, distinct and contrasting concepts are held by different facutymembers, resulting in a nearly tangible tension in some architecture programs. Ned’s experience, which includes not only involvement at his home school but also visitations at different programs around the world and involvement in educational and architectural associations, brings him to believe that “though architecture deals with broad issues, it is predominantly framed by a narrow belief, which is that form is everything.” This simple statement summarizes many feelings and experiences recounted, though not directly verbalized, by the participants.

Ava, drawing on her experience with training and outreach into the architectural community, also believes that there is a divide within programs and culture that serves as a barrier to the integration of sustainability themes. “I think that the biggest barrier is trying to close that gap between design and technology.” Paul specifically references this divide in his experience with different programs, speaking about schools that are perceived to be more elite, with a “high design” reputation. “It’s more about form, and they aren’t thinking about sustainability. They seem to believe, ‘We don’t have to think about this. We’re at another level.’”

Michelle feels the divide as well, but believes that design-oriented faculty members are becoming more inclined to express an interest in sustainability. She believes that the primary barrier with designers is the ego, or hubris, which effectively shelters them from being interested in or gaining new knowledge. “They have so much ego that they don’t
know *what* they don’t know.” However, she thinks this population of the design elite is beginning to realize the currency of sustainability, and is interested in adding these terms to their repertoire. “They aren’t just giving it lip service when they talk about it. They are definitely interested, but because they’re so confident in their design skills, they don’t always pull in people for questions or input to get the information they need.” Instead, each faction – design and non-design - sticks to their own side of the divide, “feeling like they need to protect their turf. Just because technology-oriented faculty may teach design studios, it doesn’t mean [they’re] viewed as equal. That’s the problem.”

This division can also be seen as a **split between qualitative and quantitative**. While all participants agree that architecture should be “both” qualitative and quantitative, Larry points out, “We haven’t made the transition yet to technology being an integral part of practice, or part of what everyone would consider to be a designerly way of thinking. It’s still just applied technology.” Through the acknowledgement of these divisions within the field itself, participants feel strongly that there are internal disciplinary boundaries that need to be addressed in addition to interdisciplinary logistic issues across fields.

**Responsibility**

Participants commonly feel that many of their peers, both within their programs and at other institutions, do not feel a responsibility or need to address issues of sustainability, or to truly incorporate green building in their courses. Some of the interviewees thought that condition might result from a lack of understanding, both of current issues facing the profession, as well as sufficient knowledge of the methods necessary to successfully teaching green building themes. Paul recounts an example of this lack of knowledge: “Other
instructors actually joke with me by saying, ‘The student is proposing something that I don’t know how to do.’”

Various participants feel that some faculty members shirk their responsibilities, believing that such concerns are outside of their realm of content obligations. Other faculty members maintained that these issues were more appropriately allocated to other professions; for example, energy consumption would be better addressed by mechanical engineers, wastewater by civil engineers, stormwater runoff by landscape and civil engineers, etc. Participants feel this attitude was akin to passing the buck, and not at all a responsible position.

As study participants relay their perceptions of others’ feelings toward sustainability and green building, or their interpretation of the thoughts of faculty “not on the bandwagon,” many perceive there to be a feeling of ambivalence. Michelle notes, “We have some faculty that are just… They’re not antagonistic to it, but they are probably never going to learn it.” This hesitancy to become involved is interpreted as related to, and even intertwined with, lack of understanding and passing responsibility to other parties.

The issue of greenwashing is also cause for concern, primarily due to the fact that study participants believe that the concerns of sustainability require both knowledge and action; by participating in greenwashing – or claiming to address issues in depth but only glossing over – a faculty member is as irresponsible as if they had not addressed sustainability at all. Baxter cites an example: “One faculty member throws the label on the studio because he feels he wants to do something. He still doesn’t have all the information that he probably needs to be a really substantial designer engaging these issues, though he is
a talented designer otherwise.” These types of situations are perceived as a disservice to students hoping to engage the subject meaningfully, as well as a disservice to the profession that needs educated graduates who are ready to contribute to the profession.

5.1.3. Framework Development

Table 6 illustrates the properties and dimensions found within the developing category of Framework Development.

<table>
<thead>
<tr>
<th>Framework Development</th>
<th>Dimensional Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property</strong></td>
<td><strong>Dimensional Range</strong></td>
</tr>
<tr>
<td>Rhetoric</td>
<td>Specific terms, relationship of terms and knowledge</td>
</tr>
<tr>
<td>History</td>
<td>Not a new subject, static</td>
</tr>
<tr>
<td>Understanding context</td>
<td>History, priorities, financial</td>
</tr>
<tr>
<td>Complexity</td>
<td>Process, frameworks, creating priorities, research</td>
</tr>
</tbody>
</table>

Rhetoric

Reflecting on the relationship between discourse and knowledge, or rhetoric, participants primarily hold the same positions: different levels of definitions ultimately do not matter. Ned says, “You don’t achieve sustainability by defining it”, summarizing this perception. The first question of interest regarding rhetoric is the actual terms used when discussing sustainability or green building methods; the second question is how well people actually understand what it is that they are supposed to be talking about.

First, all participants are very hesitant to talk about specific terms such as sustainability, green building, carbon neutral, or regenerative. When asked about terms, many actually say that they either do not think about them or try not to use any of the terms at all. Ava articulates, “I don’t teach about it, I teach the principles of it.” The point of her
statement being that the larger movement is not defined by one term that is more appropriate than another. In Ava’s perspective, there are principles and underlying values that define the subject better than any single term possibly could. Barry’s discussion supports this theory, as he says, “Basically, what we do in school is teach students the vocabulary of architecture.” In other words, principles and strategies are emphasized over the delineation of terms. Barry, however, is happy to use whatever terminology comes up. “I love them all. It makes it interesting to talk about it because each one puts a little bit different filter on what you’re trying to do, and I think all the terms are descriptive of good paths. Architecture is such that there’s no right answer. I love the ambiguity of that.” This concept returns to reference the methodology and philosophy used in the design process.

Barry’s statement speaks to the connection of knowledge with terms and using the terms appropriately, moving the issue from using a favorite or favored term in conversation or class to understanding the differences between terms (which may vary with different individuals) and what exactly is being discussed at any given time. Larry states, “Until we’re serious about operationalizing what the hell it is we’re talking about, we just talk. The conversations are still interesting because everybody has their own origins of what they think sustainability means, or what they think design means. They’re very interesting. They’re very generative and fruitful.” This opinion speaks to another larger interpretation about the scope and scale of sustainability, innate questions in the popular but poorly defined terms of the movement.
History

A distinct and common thread appeared throughout the interviews, illustrating the fundamental belief that sustainability themes are not new to architecture. All participants feel strongly that sustainability is integral to design, and cannot be separated from what others may consider the subject of ‘design.’ To illustrate this, Baxter relays through a narrative timeline how sustainability concepts have been included in seminal pieces of design, and how designers could in fact incorporate sustainable themes without compromising their elevated design intentions. He notes:

“If you’re teaching a history course, I think it’s very easy to make passing reference to how a certain building does or does not relate to the issues of sustainability. It can be quite surprising. For example, take Ronchamp, the chapel that Corbusier designed. Well, it’s a daylit building, and he was very careful in how he striped the light in, how he chose to pencil it in, how he created that wonderful wall that has a brilliant color mix and the drama of the space that results from the management of light. There’s a case in point of how the building is interacting with nature so fundamentally.

Similarly, that very same building harvests water off its roof and drops it into a cistern on the backside. You don’t think of it as a cistern because it’s just a pool, but in fact there’s a tank underground for collecting water. He was doing some things that responded to these factors just by nature, just by his own design ideas about the importance of light. So, in a history course it’s easy enough to cite examples and say
‘By the way, you could look at this through the sustainability lens and you could find these six or eight or ten things going on.’”

Understanding Context

A popular notion in the sustainability movement is systems thinking and interdisciplinary design. Participants agree with this emphasis by speaking about an increasing spectrum of considerations, including the design process and the final product. As Peter notes, “There is a product that they have to understand, ‘Okay, this is where we’re going. This is our goal. This is what we have to achieve, and this is how we’re going to get there.’” This exemplifies Peter’s belief in presenting his students with a possible path to follow that appreciates not only the decision making process and the considerations required, but also the end performance criteria of the building.

In addition to the frame of considerations that are being taken into account, there is a cultural and situational context that students also need to understand. For example, relating design strategies to costs in a potential design is an important element in building a foundation of knowledge. Michelle states, “What’s the designed load for water? How much is needed? Look at the site and see how much you can store, then look at the size and cost implications.” In other words, there are opportunities, limits and important context that must be considered in partnership with potential strategies.

As students begin to understand the breadth of the issues that need covered, priorities can be provided to help guide the design and consideration process. Ava relates, “In the intermediate studios that I’ve taught, I’ve really tried to have them clarify their ideas in concepts. Something that they can clarify in one or two sentences and validate later.” In
Ava’s view, **creating criteria for and prioritizing the design goals** is just as important as the design concept itself.

**Complexity**

Participants hold varying views about the **complexity of ideas** that are necessary to include in courses and curricula, as well as how to understand that complexity. Referring to the Boyer report, Ned explains, “Boyer said that design education is great because it teaches people to deal with and solve very complex problems.” However, some participants wonder how to address the increasing levels of complexity that come with sustainability.

Baxter shares his understanding of how the educator and designer manage these layers of complexity to incorporate issues of sustainability: “You are involved in a management process of getting control over complexity. You have to be very thorough in laying out the framework issues that you’re going to engage, and you have to be very articulate in presenting how you’re thinking about those issues as you develop your strategies and your transformations, so it’s a different approach.” Drawing on his 20+ years of experience in architectural education, as well as his involvement in national task forces focusing on sustainability education, Baxter brings up another issue of **awareness**. “We create our own problems the minute we make a gesture, make a choice, the minute we choose a material, a placement on the site, an attitude about the sun. Whatever attitudes we bring to the design, we are constraining, and influencing what next comes as design decision opportunities. So we create problems in the process as much as we’re solving any problems.” These statements illustrate Baxter’s concern with the context given to students regarding their design process, from both faculty members directly and the established
framework of the courses or curriculum. In essence, beyond a fuzzy creative process that starts with programming, there is no alternate plan.

Larry’s exposure to and interest in other traditionally non-associated fields provides slightly different influences in his perspective on the issue, but effectively yields the same results. “The problem is that because complexity is so overwhelming, and it actually transcends human understanding and human ability, that most people just say, ‘Well, let’s tame it. Let’s just deal with the parameters that we can get our heads around. Since we’re dealing with limited rational cognition, limited time, and limited resources, let’s redefine the complexity in simple terms, and solve the simple problem instead.’ So we set up a design intention, and a budget, and we solve a simple problem.” Supporting this notion of overwhelming complexity, multiple participants bring up the notion of the Wicked Problem (Rittel and Webber 1973; Conklin 2005), which addresses the notion that some problems are so complex and multifaceted that they often create other problems as they are being solved. Without actually referencing this specific term, Baxter reiterates the idea: “We really shouldn’t be focusing on problem solving, which is a reductionist, scientific minded sort of prejudice about what we’re doing in studio.” Instead, he believes that educators should be focusing on skills and framework development that continues to serve the students long after the current studio problem is solved.

Participants, thorough extended narratives, share ways in which they help students to view and organize complex problems. Peter talks about the education that happens through integrated design and project-based learning, and how that specific knowledge helps to develop an individual organizing process. “You begin to get into a design method and a
planning method that capitalizes on trends, but also crystallizes it. As you begin to get that established methodology into how you’re thinking, you begin to take that methodology and you begin to use it in how you plan. So effectually you’re planning whole ecosystems. And that knowledge changes the whole playing field.” Peter’s approach allows him to flow between large-scale and small-scale design issues, but focuses on foundational philosophical issues that can be generalized and extrapolated to different scales. While the majority of his work is at a very detailed level, the principles that he has developed guides his process and thinking.

Again pulling from his interest in psychology, Larry explains his version of the design process. “It’s a spiral, which is basically the only way to deal with complexity. Architects are very good at this because we don’t reason deductively from the general principle down to the detail. And we don’t work inductively, from collecting all the facts, and trying to espouse a theory about everything we do. We start in the middle and we try to see how that fits. And there really is a hermeneutic kind of iterative process. When we accept that, then I think there is a new idea about architectural education, including continuing education that can take us into real sustainable architecture. Until then, we’re trying to address a complex idea with sort of industrial age solutions.” This perspective also emphasizes an interpretative and iterative process, outlining a conceptual framework for a proposed design process.

To help their students through this complexity management, a number of faculty participants have established a framework, concept or tool that students can use as a touchstone throughout their educational and professional career. Paul shares his own method
of helping his undergraduates through the process. “I do think a lot about the process and actually show the students a diagram in which they can begin to understand where they are in this design process.” He also talks about a “roadmap” that he provides students to outline potential considerations as they proceed through the design process. “I think it’s good that the students understand, ‘Well, I can do this or I can do this.’ They can map their process and select the tools that they need for each juncture. I’m providing this map in studio, but they should be able to implement this themselves in other projects, and select the tools that they need to accomplish their objectives.”

Ned’s approach to providing students guidance is the use of a heliodon, which he feels provides insight to issues that are fundamental to the design process. “The heliodon is an incredibly useful tool for convincing people of a number of things. Primarily, how much the sun impacts a building, and how that factor is a function of site, orientation, window location and form.” Through the use of such an instrument and the implementation of the findings, students establish an understanding of important issues in the design process, and how to address them.

Baxter feels that abstract concepts provide his students with a useful framework to reference in their future paths, and allow for the modification of these frameworks as concerns in the profession shift. He has developed a matrix involving different levels of strategies to help his students identify and understand how their design decisions may impact not only the end result, but also the final product after time has elapsed. The matrix addresses various levels of impacts and methods of integration. Baxter believes that larger questions are important, such as “What makes this building run and work? And if we think
of it as an organism in the landscape, how is it surviving in its ecosystem and its context?” Understanding the building from this type of whole-systems view provides “a useful scale or model because a lot of people can join into the conversation.” His framework helps these conversations.

Peter believes there is a usefulness in creating a framework at a larger scale, focusing on networks of collaborators, detail development, and implementation. His primary belief is that the majority of problems currently addressed in architectural education are looking at the wrong scale, and do not contribute to growing or establishing any knowledge; currently most projects address a middle range, not looking either in detail or at larger, natural systems. Through involving students in his research, Peter enables student involvement in real-world projects at these different levels: either more detailed than the typical studio problem, or at a much larger environmental scale. By empowering his students to understand larger, regional or global issues that are transferable to other contexts, he helps them to understand the needs of specific projects and populations at a detailed level.

When talking about a detail project for high-rise buildings, he claims, “Traditional studios wouldn’t dare do something as simple as this.” Yet he believes that this simplicity, in light of a larger framework, could actually make a bigger impact in the building industries. By taking a detailed project such as this and developing the industry network, Peter notes, “you have ways of actually implementing something in some part of the world that makes a difference.”

Finding useful the pragmatic frameworks that can be readily applied in the workforce, Michelle often references rating systems like USGBC’s Leadership in Energy and
Environmental Design (LEED), though she is reluctant to rely on them alone. She feels that it is important for students to have an understanding of a philosophy of sustainability, rather than relying on a checklist. This enables their established frame of reference to be a greater, over-arching understanding of the issues instead of bullet point strategies. To respond to this need for a philosophical base, Michelle identifies a number of different philosophies and has her students review them, enabling individuals to select the philosophy to which they identify and subscribe, understanding that different rating systems such as LEED and Green Globes are more pragmatic and strategy oriented. She feels that this dual approach enables the students to begin to talk about sustainability with clients both pragmatically and philosophically, and allows them to hold meaningful conversations addressing different aspects of sustainability to understand their client’s specific views.

Ava focuses on supplying her students with analytical experiences of real buildings, engaging them in the implementation and assessment of specific high performance strategies. The methods include case studies or exposure to energy modeling, each of which develops a level of familiarity and understanding. This base establishes a solid foundation for understanding green building and sustainability themes. In one instance, some of her students completed hand calculations on heat transfer through estimating which, while it proved to be extremely difficult, provided the students with an intuitive sense of the considerations and outliers incorporated into their projects.

Ava also recounts different exercises that focus on one or two strategies, relaying more obvious and tangible bits of knowledge to the students. For example, “everybody has to make a daylighting model of a classroom by a certain date, and we’ll go outside and test
it.” These simpler, focused exercises build a solid grasp of one strategy at a time, which students can then integrate into a larger framework or project down the road.

Another method for creating frameworks for implementation is to establish design priorities within the courses and projects. Some faculty members outline the importance of energy to their students from the beginning. Ned is very clear about his priorities within architectural education: “I would guess 95% percent of studio faculty do not understand solar geometry or solar responsive design. By sustainable, we mean buildings that don’t use much energy. Everything else is immaterial. If we don’t solve that, nothing else is going to count.” Similarly, Paul tells his students that the focus is on carbon neutrality. “I’d say it’s the most important issue we’re facing right now.” Stating this type of prioritization up front also helps students to understand appropriate and meaningful implementations.

Such narratives from participants outlining how to address different issues shows that, as a group, the participants feel that the current architectural design process, and the education of that process, does not address the current problems in the profession.

5.1.4. Student Activities

Table 7 illustrates the properties and dimensions found within this developing category.

Table 7: Category 4: Student Involvement

<table>
<thead>
<tr>
<th>Property</th>
<th>Dimensional Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student needs</strong></td>
<td>Pragmatic, real projects, integration</td>
</tr>
<tr>
<td><strong>Student characteristics</strong></td>
<td>Predisposition, thinking process, outreach</td>
</tr>
<tr>
<td><strong>Involvement</strong></td>
<td>University level, projects, research, travel, competitions</td>
</tr>
<tr>
<td><strong>Research Centers</strong></td>
<td>Student involvement, interdisciplinary</td>
</tr>
</tbody>
</table>
Student Needs

Jared notes that one factor that he believes needs to be taken into consideration is the different personalities and needs of various student populations. His program is highly pragmatic, catering to blue collar, in-state students who are likely to have jobs while in school. “It plays to the audience,” he says. “Our students need professional practice.” For his student body the inclusion of sustainability into professional practice courses is appropriate, though he notes that this emphasis on professional practice and pragmatism might be easiest to implement on a program-by-program basis.

Similarly, Michelle’s experience draws on what she perceives as a gap in pragmatic education methods. “I see my students getting all of this design experience and learning about manipulating forms, and what they don’t get is how you take the pragmatic elements that are learned in your practice and in ECS classes, and how it gets included. How do you establish a thorough understanding of program? Do some preliminary energy analysis and have that be part of the design process.” Building on a practical and pragmatic background, Michelle notes some of her interactions with design-oriented faculty. “He says, ‘You should be showing them more design images of things.’ I think they know that part of it. What they’ve never done is they’ve never made buildings that work. For once they can actually make something that works.”

Ryan, a practicing green building consultant and sustainability expert, echoes the emphasis on project-based learning. By involving students in project-based educational methods, students can witness the reality of integrated design and internalize it much more
easily. In Ryan’s practice, there is no role for encapsulated designers, or even isolated thinkers. Each participant in the design has a role to play, and not everyone is called on to contribute with their specific skills and expertise at the same time; however, bringing everyone to the table around a specific project, helps to ensure that gaps are not left in considerations and everything is addressed during the design process.

**Student Characteristics**

Reflecting on the students that he has seen throughout approximately 20 years of teaching, Larry shares thoughts on the differing personalities who are attracted to the architecture program. “The really wonderful thing, the thing you cannot forget in any of this, the thing that makes architectural education work, is that every single student has an undying belief that they can make the world a better place through a thing called design. And it’s the only thing that anchors architectural education. It’s our currency. We don’t have to get people to like math. We don’t have to get people to buy in. They come to us with an undying belief that they personally can make the world a better place through something called design.” In Larry’s perspective, this predisposition is the glue that allows architectural education, and the culture that is crafted through the studio courses, to work.

Related to this is Barry’s feeling that his students have an innate “spirit that encompasses sustainability… some concern for the earth.” He also believes that his students bring a larger perspective to the realm of architecture, understanding sustainability as a social problem where architecture can contribute to a solution. When asked about a perceived focus on aesthetics within architectural education, Barry continues, “My students basically don’t buy that. Maybe it’s just a humbleness of character, I don’t know. They’re
just sort of regular people. About half of them are from the state. We aren’t an elite school, so they come here because they want to come here, because they heard about it and know it’s not a prestigious place. I know a lot more mature people come here because it’s inexpensive and also because they know we’re green. Those are two big motivators: the greenness and the tuition.” For Barry, his students are already on board and informed.

Michelle and Jared see their students as very pragmatic, interested in the practical application of sustainability and green building themes. Michelle uses an example of a project in which a clinic was going to be built in a foreign country. She says, “The students taught their own classes and incorporated a group that were going to be the designers. The students had a lot to do with the initiative, moving it forward and getting it done.” Jared, similarly, notes that his students are focused on the applicability of methods, but because most of them are working while they are in school, they are focused on positioning themselves for full-time employment when they graduate.

Involvement

Ava, drawing on her faculty experience at different programs, emphasizes her belief that the successful integration of sustainability themes hinges on how involved the students are with different projects. “I think the schools that have a culture of activities that students can become involved with and take leadership roles in are most successful.” And this does not only help the students with initiative and resume building. Ava notes, “The more ownership the students can take, and the more steps forward the student body takes, it helps move the faculty forward curriculum wise.” Paul echoes his experience with student
interest and states, “…even in the schools that don’t have sustainability as a explicit direction, I think the students are still interested in it.”

Part of the student involvement that participants advocate for is student contribution to university initiatives such as a student-run sustainability center for the university, organization and management of conferences, and project outreach. As covered in the previous section on cross-campus involvement, Barry’s students initiated a student-run sustainability center on campus, funded through additional taxes on tuition. Michelle notes a similar action on her campus, in which students created an umbrella organization for all the student clubs and other campus initiatives addressing sustainability. The students at Ava’s school organize and run a successful conference focusing on sustainability themes, communicating their interests to not only the faculty, but also the university as a whole. In addition to this totally student-run initiative, Ava encourages her students to present at and attend conferences, participate in published work, and extensively experience buildings first hand.

Participants also feel that research is another integral part of student involvement, whether it is traditional research or applied research. Peter notes, “Architecture students, by the way, are rarely ever connected to serious research.” The interviewees are very interested in creating connections between their students and environmental values, as well as knowledge, information, and practice; being involved with different aspects of research aides in developing these important themes. Ava notes, “Giving students a chance to experience real buildings in a very analytical way helps.” By doing this, the students experience “a little bit of learning new research skills, but it’s also building on what may be
already well-known. For example, they may be learning a common principle, but through the research investigation they’re finding out a little bit more. From my perspective, they’re going to remember more of the principles and concepts from doing a case study than from taking a multiple-choice exam. And they’ll have something to put on their resume. They have gone and investigated a real building. The hope is that the lessons that they learn in the research will be able to be applied later on.” In reference to including students in charrettes and workshops, Ava says, “I want to give them any chance possible to have exposure and to listen to what’s going on first hand.” This strategy even involves something as simple as observation at a professional event.

Others feel that any type of related data gathering is beneficial. Paul says, “I think it’s important to have them do research in digital or analog tools. We have to learn how to use them, when you’re going to use them, and need to know when you can use any of them.”

Paul also tries to get his undergraduates involved with conferences and travel. Understanding that typical studio projects are completed and shelved, he says, “I’ll try to get them to a conference or something so that the project doesn’t stay in the classroom. They do a lot of work in ten weeks and it should be seen.” Involvement in travel is a common theme identified by a number of participants. Barry notes, “A lot of architecture is solving urban problems, so we do vast studio field trips to more urban places, as well as summer studies abroad. A big part of understanding various problems and various solutions are seeing them.” Michelle also cites extensive off-campus opportunities that include not only travel to conferences and urban areas within the United States, but also notable locations in other countries, which she claims, “engage students on a different level.”
Enabling students to participate in competitions is another method participants cite for student activities. Many sustainability competitions address integrated problems, at times requiring interdisciplinary teams. Though Michelle feels that competition deadlines are sometimes at odds with academic schedules, there is value in engaging the students in a larger initiative, and adhering to the metrics outlined by the competition program. Ava likes competitions for their requirement of calculations, but also employs various informal competitions in the course work, allowing student groups to play off each other. She notes, “Any time you can put students in competition with each other, there’s a lot of learning that takes place.”

Research Centers

Though research centers were not communicated as integral to the students and curriculum at many of the participant programs, there is a feeling that these types of organizations could benefit students in a number of ways. Not only can centers provide structured interdisciplinary work, they can also engage students in projects and research outside of the traditional studio setting, connecting the students at another level. Michelle has had experience with a number of research centers, both as a participant and as an organizing member. She says, “I think they could help to unify the campus by including various staff as members. There are faculty members that are ‘outside’ the realm of teaching that have these research projects that aren’t well connected to the faculty body, and they could become members. And students could join in as well.” She also notes that other universities have “proliferated their centers and institutes as fundraising mechanisms to shore up the funding for their campus.” When asked about the involvement of research centers,
Ava said, “There may be something to that. Whether it’s a research center or some other mode of inquiry, it could engage and offer structure to the student activities.”

5.1.5. Faculty Involvement

Table 8 illustrates the properties and dimensions found within the developing category of Faculty Involvement.

<table>
<thead>
<tr>
<th>Faculty Involvement</th>
<th>Dimensional Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience</td>
<td>Ivory tower mentality, professional experience</td>
</tr>
<tr>
<td>Responsibility</td>
<td>To students, to profession, to world, accountability</td>
</tr>
<tr>
<td>Style</td>
<td>Instruction personality, methods</td>
</tr>
</tbody>
</table>

Faculty participation is another key ingredient that participants believe to be vital to the integration of sustainability into architectural programs. Michelle quickly notes that faculty are the most consistent element in architectural education, beyond students and administrators and, therefore, the most difficult to change. Somewhat jaded from his experience in attempting to integrate these themes over the years, Larry says, “There is only one way, one and only one way to change faculty. It’s called new hire.” While other participants are not as obviously cynical, there is a common thread of trying to understand which individuals in their faculty might be receptive to a new paradigm; other faculty members are seen as lost causes.

Establishing sustainability as a theme within the whole school, and agreeing on it as a faculty, hastens this larger transformation. However, even when faculty reaches an agreement in some locations, there may not be follow through or implementation. Ava notes,
“All studios were supposed to reference energy reduction and the 2010 Imperative in their syllabus and do something about it, but I don’t think it really happened.” No accountability measures were put in place for reporting.

Other participants believe that peer faculty members not currently on board with sustainability are actually interested, just lacking any foundational knowledge to help them implement and integrate. Some thought faculty workshops could be an answer. “We did it with software. Our first year design instructors offered workshops during the break for faculty and they got very good attendance. Even if people aren’t going to use it at least they can get a sense of what it can do. If you have faculty learn together, separate from the students…. It went really well. Most of these people actually want to know this stuff. A lot of them do seem interested in training, but they don’t want to be exposed.” Michelle’s perspective has evolved through her experience at her small, west coast school. Some faculty members are not on board, but she admits that most seem open to the currency of sustainability and do understand its importance.

When asked about the possibility of training other faculty members, some participants are not as optimistic, like Ava. “If the [omitted] Project goes through, the next step is really training. If we hold the training, again it’s us telling them what to do. It’s not the approach…. Even if you supply them with all the help they want, there still has to be a different kind of incentive.” Ava’s comments illustrate her personal experiences with different faculty personalities at schools where she has been on staff, ranging from reputed high-design schools to well-integrated programs. Her experience in trying to assist other faculty to “come up to speed” in building science and sustainability efforts colors her current
perspective of the integration issue and has an impact on how she proceeds with her creation of projects, courses and outreach. “Folks that are way on the extremes,” she says, “Honestly I don’t think they’re going to change.”

Ned shares similar experiences. “I offered to give a free workshop to my colleagues, and they didn’t show up. The department head showed up. Nobody else. And I said to the department head, ‘Why don’t you force them?’ He wouldn’t even consider that.” These experiences illustrate the frustration felt by faculty participants willing to assist other educators to sharpen their skills and bring them into a meaningful conversation.

Responsibility

A common theme through the discussions with participants is the issue of preparing students for practice, and **how practice has changed** over the years. This reflects the also-common perspective that the evolving state of the environment has changed how architects design. Participants feel that some faculty members acknowledge this responsibility and others do not.

Baxter views **faculty autonomy as a possible problem** with studio faculty in architecture programs. “Some see the studio is an opportunity to indulge in something we’re interested in, and we cross the line between our own personal needs and interests and that of the student needs and interests.” In other words, faculty can prioritize their interests over their responsibility to the students and to the profession. Going farther into the topic of faculty responsibility, he continues, “It’s a contract between faculty and students, and it has to be understood on both sides as a legitimate social contract where we have a privileged role
as a faculty person and they have a privileged role as a student. We’re engaging in a privileged interaction, and we have to protect that for all the good it can be.”

Larry’s experience leads him to believe there is an issue of ambiguity in the lack of established goals and assessment methods; in short, faculty members are not held accountable. “Faculty won’t [integrate these sustainability themes]. We need to take them all into the auditorium, and sit them down, and say, ‘You’re fired. Here’s your new job description.’ Maybe they still wouldn’t do it. Their ethic is more of a cultural one than a social one.” Larry feels that his design-oriented peers place more importance on loyalty to the culture and history architectural education, as discussed earlier. Comparatively, his peers that are involved in the sustainability movement are more socially oriented, drawing from the issues and movement in larger societies. He believes that design-oriented faculty members are encapsulated, burdened by their history and an established vision of what design should be. While they believe that they are embracing what design could be by breaking down theoretical boundaries in form giving, they are, in effect, traditionalists and conservative thinkers.

Michelle’s faculty is starting to address this assessment question by creating internal rubrics focusing on assessment strategies and learning outcomes, though they have not yet defined metrics. “Now it’s more a scale of awareness moving toward being defined in terms of metrics – how much progress or how many of something.” Without an established measuring stick for assessment and comparison, Michelle believes that there is a very real problem. “There is a problem because it is about quality and reliability and results, and design faculty often don’t worry about that stuff. We need to impose on ourselves some of
the same things we’re talking about with metrics.” Ava agrees. “As I see it now, everybody’s doing their own thing. And that’s fine as long as we get to the end where there is an integration of ideas and disciplines.”

*Style*

As expressed in a number of interviews, the success of this type of integration substantially depends on the **instruction style** of the faculty member that is teaching studio, or any course. Michelle views the educational process as exploratory and critical-thinking based. She believes that it is her role in studio to understand and respond to what the students need and want to know, not particularly what she individually wants them to know. “Are you demonstrating for them? Are you really imposing your design ideas on their development, or are you more of a facilitator that is recognizing and developing their potential to think for themselves and enhancing and more guiding in that way?” While others do lay out more particular information, especially in courses like Environmental Controls, many participants focus on this type of critical thinking and analysis.

*5.1.6. Curriculum Integration*

Table 9 illustrates the properties and dimensions found within this developing category.
Table 9: Category 6: Curriculum Integration

<table>
<thead>
<tr>
<th>Property</th>
<th>Dimensional Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>Alignment of courses, scaffolding, support courses</td>
</tr>
<tr>
<td><strong>Studio</strong></td>
<td>Problem solving, deliverables, simulation, assessment, structure, tradition</td>
</tr>
<tr>
<td><strong>General Issues</strong></td>
<td>Course content, course structure</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td>Projects, research, travel</td>
</tr>
</tbody>
</table>

**Structure**

When asked about the impact of the structure of the architectural curriculum on the integration of sustainability themes, many participants express underlying approaches toward this inclusion. Baxter builds on his extensive experience saying, “It necessitates that first you have to find a way to bring sustainability into the studio setting, since that’s what everybody is most focused on, but you also have to find a way to feather it into all the other courses that are offered as so-called support courses.” He acknowledges that this approach is based on “the notion that studio is somehow divorced from support.” In other words, while studio is the unrivaled backbone of architectural curricula, the way in which **studio is or is not actually integrated with other courses** in the curriculum is a point of concern for participants.

Ned, another participant with extended experience at a large school, looks at the issue while understanding the tradition, rigor and reverence of architectural curriculum. “Because this integration is like a back door, right? You’re not actually asking to change curriculum. You’re just giving them a tool that is going to, in effect, change the curriculum. It’s going to change the emphasis.” That is to say, integrating a new perspective into existing courses.
Through these statements, Ned acknowledges the weight and importance of standard topics covered in architectural education, such as structures and materials, and notes that these critical elements cannot be changed. However, his belief is that the application of an overlay, or theme, than can be incorporated across the program as a whole with some promise. Building on both Baxter’s and Ned’s perspectives, the individual courses in the curriculum are separate, disparate, and should be more cohesive, even without a sustainability theme being a factor.

In line with his previous discussion on the creation of frameworks, Peter believes that architectural education needs to be completely restructured. He claims, “We have no strategy in education to hit the big low-hanging fruit. To actually make a difference.” As noted earlier, Peter believes studio schemes focus on middle-scale projects that do not have a tangible impact on the profession. He describes an approach to problem solving by taking a whole problem and, instead of addressing the problem comprehensively as is typically done in studio courses, separating out different elements of the problem and breaking them down into parts.

By focusing on those distinct parts, it is easier to understand the larger problem. “You identify one, and you think, well, you’re actually solving the whole problem if you solve this.” He believes that no trigger points, or points of influence, are identified by continuing to explore architecture through the same, traditional process.

Instead, an alternate way to investigate architecture is through the identification of patterns: patterns of failure, patterns of success, patterns of implementation, etc. Peter wonders, “Is there some slight possibility that you could actually mine knowledge and mine
patterns and mine things to get combinations of information that begins to point you in
certain directions for future involvement and research?” In other words, Peter believes that it
would be worthwhile to complete an analysis of the architectural field and each of its systems
to look for meaningful direction for future work and research, identifying the most salient
leverage points on which to expend the most effort. This proposed shift in architectural
education, by systematically looking for patterns within building design and technology and
not creating from scratch, would necessitate a pedagogical shift across the board. Peter insists
this is necessary to generate any type of meaningful impact or applicable results within
education.

**Studio**

The primary element of an architectural curriculum is the studio. The frequency and
the depth at which it is discussed with each participant support this. Toward the beginning of
his discussion, Baxter again notes, “You have to bring sustainability in first of all to the
studio culture, which dominates all schools, even in Europe, and South America, and Latin
America.” Because the studio itself is so complex, a number of sub-issues emerge through
the discussions surrounding studio issues:

- Problem solving
- Simulation
- Scale of projects
- Deliverables
- Assessment
- Course structure
Problem Solving

The notion of **problem solving** emerges as a subset of the studio conversation regularly in the early interviews, and is supported later as the interview process progressed. Generally, the studio courses address a programmatical problem in which an issue such as site or program must be ‘solved.’ The individual perspectives brought out in interviews regarding this approach, however, are highly variable. Baxter feels that there is a problem with this stating, “One of the difficulties with studio teaching is that it focuses on a thing called problem solving, which I think is a flawed premise, because it puts the students and the faculty into the zone of discussing how to fix something or how to answer a question. It presumes implicitly that there’s a single potential response – or that you’ll know you’re done when you get an answer.” As established in *Section 5.1.3. Framework Development*, the issues are perceived to be too complex to address in a reasonable manner, and there is likely no single response.

Simulation

A somewhat complementary issue to the notion of problem solving is the idea that architects are ‘renaissance men’ with the ability to see issues from a **holistic perspective** and to understand the criteria associated with each problem. This holistic approach is now embodied in computer programs, enabling individuals to understand multiple facets of the complex problem. One of the primary tools being developed for green and sustainable designs is building simulation computer programs. Many participants are in favor of using simulation programs to enable students to better understand their designs in a more realistic manner. As Larry says, “…there’s going to be a big influx of software in the studio.” This
software enables students to explore other realms of practice that were previously more
difficult to access. However, many participants also feel that some of the available programs
are not suitable for integration into studio schedules, simply because of their complexity and
time intensive learning curve.

Some participants shared feelings of ineffectiveness when they attempted to integrate
**substantial computer programs** into studio. As Baxter says, “There is so much that they’re
engaging in their education to begin with, much of which is new to them, it’s the first time
they’ve been asked to do something in a studio context. It’s a little hard to integrate software
education in with the actual architectural education without the students getting
overwhelmed.” Baxter’s statement refers to an issue discussed previously: the tightly packed
curriculum structure in architecture, complete with copious amounts of information and
subjects to cover. Baxter provides this example: “Using Ecotect is problematic because it is
a fairly substantial software tool and it takes a while to learn the intricacies of it. In 15 weeks
it’s a lot to cover.” Regardless, many of the participants feel the simulation programs to be
so valuable that they find a way to begin to integrate software into the design process despite
the difficulties.

Some participants feel that integrating compartmentalized pieces of computer
simulations into their courses early would at least provide the students a taste of simulation,
even if they were not yet able to understand all the criteria, components and complexities of
the entire programs. Paul notes, “These kids are more and more computer savvy, so I do
more and more computer work in studio, and earlier as well. Really it’s just a daylight
module in Ecotect, just some simple daylight factors. And then of course, Climate
Consultant and the Climate Analysis, and maybe a program addressing heat, which is also very easy to use.”

Another computer program obstacle, as recounted by the participants, is perceived by some to be a contradiction with **how the design process is currently taught.** Larry describes his position: “As an integrated practice in Building Information Modeling (BIM), all the information is generated at the same time, and it’s parallel, it’s not sequential. Studio thinking is going to have to shift from its historically linear model. It has to become parallel rather than sequential and designers and students can’t say, ‘Well, you think about that later.’ No, you think about everything right now with these programs.” Larry’s perspective on simulation techniques and process conflicts convey his beliefs on the different methods of design process. His disclosure also illustrates his support of the importance of whole-building simulation in architectural education.

Participants also encourage students to experience other **forms of simulation.** Ned continues to express his firm belief in the use of a heliodon to help students learn how to design. He says, “Doing energy analysis with a computer is not the most efficient or best way to teach a student to design energy-efficient buildings.” Instead, his experiences have established a belief in the use of a hands-on design tool that he feels is better suited for understanding passive design. This simulation method allows students to easily modify their design and see the effects created, as opposed to an automated rendition of cause and effect.

**Scale of Projects**

Similar to Ned’s affinity for physical simulation using a heliodon, another faculty member in the south, Peter, firmly believes in the **creation of prototypes** for not only testing
but also for mass production. Recounting his experiences through his own architectural education and the faculties he has been involved with, Peter has established a belief that prototypes are absolutely necessary for the future of architecture. He reflects on the range of studio projects that he has been associated with and says, “So we never, seriously, thought about the fact that we’re actually trying to create prototypes.” His current research focuses on the intense study of different scaled problems, be they single modules or re-designs of cities hit by natural disasters. He tests and develops replicable solutions to witnessed problems, and involves students in the whole process. While Ned’s and Peter’s fundamental approaches vary regarding what and how environmental issues need to be addressed within design, the commonality between both approaches is the use of simulation tools.

**Deliverables**

Relating back to the notion of problem solving is the issue of *deliverables* in studio courses. Most of the participants believe that studio projects are often times too grounded in theory and aesthetics. Peter notes that, “It’s not focused on doing a job that you have to produce.” This fuzziness in final project requirements allows for inconsistencies and individual logic to produce a product that may not actually function out in the real world, yet may have all the elements required by the course. When asked about what types of deliverables are necessary in their studio courses, participants cite various strategies associated with sustainable design. Jared, referencing his state school in the Midwest, underlines one of the primary difficulties with studio projects: “It’s such a big topic that sometimes the concentration is daylight, sometimes understanding difficult sites.” The possibilities for studio are so vast that many find it difficult to establish uniform deliverables.
Assessment

In partnership with the traditional subjective assessment structure typically found in studio, along with various deliverable requirements, participants express concern over what qualities and criteria needed to be considered in a ‘successful’ studio project. In other words, each participant has their own vision of what is considered acceptable and environmentally responsible in a studio project, as well as how students can provide evidence of the considerations. Larry, who does not regularly teach studio but frequently sits on juries, created his own assessment criteria for design projects. “It was a very nice little list of things: how to recognize something that addresses the notion of sustainability – meaningful differentiation.”

Many participants favor using simulation tools as a way to ensure that students understand the principles being taught in studio and other courses incorporating issues of deliverables and assessment. Paul, a faculty member in a program on the west coast, says, “I want proof that what they say is happening is really happening. They use computer modeling tools to demonstrate that the diagrammed magic arrows really work like they want them to work.” Another faculty member in the west, Barry, talks about final presentations in studio and how they illustrate the student’s understanding of design issues. He says, “The students could not only identify the materials, but had identified the carbon impact of materials, detailed the construction methods, and on and on, so it was a real thorough investigation. They wanted to make sure that the building was buildable, feasible, and got the carbon neutral zone.” These types of teaching and assessment methods illustrate students reaching
an additional, deeper level of understanding beyond using simple rhetoric; in these examples, students can also illustrate and achieve different strategies being implemented in design.

As a core element of architectural education, studio and its standard structure is a typically viewed as a given and a constant. Foreign to anyone outside of design curriculum, the studio structure is difficult to understand, mimic or integrate. Participants expressed mild love-hate relationships with studio and the studio structure. As Baxter noted previously, anything of any importance needs to be incorporated in the studio courses, but at the same time, “you can’t do everything in studio – in a given studio. There’s a limit in terms of time; you only have a semester. There’s a limit in terms of expertise. There’s a limit in how much content you can push toward the students without them just choking on it.” Larry, a participant that is not a regular studio instructor, says, “I love studio, but it’s ten semesters of what, exactly?” He follows up by saying, “Nobody even thinks that the studio structure and setting has to be defended because, in the end, there’s that conflation of the topic with the activity. ‘Well, architecture is too sublime. You can’t measure architecture.’” This interpretation speaks to the subjective nature of design and the ambiguous design process.

Course Structure

The combination of time constraints overlaid with a necessarily large amount of content creates difficulties in course design to cover all required and optional issues; allowing students thought processing and work time, providing regular feedback, and covering everything that needs to be covered in class proves to be a challenge for faculty. In accordance with Peter’s position that studio courses address mid-range projects, Larry points out that often times studio projects are all of a similar scope and scale that are explored
uniformly at a certain depth. In contrast, he shares a variant structure that he had heard from another faculty member at another school: “And he thought it would be advantageous to have some kind of a mix or a progression of designs, where sometimes the projects were much smaller, but the solutions were much deeper.” Paul echoes this approach: “I usually do housing, which is not very complicated, but I do that because I want to focus more and really go deeper into solving sustainability issues. So, with this program, the architecture is fairly simple and works. Now let’s go into how to make this architecture really sustainable.”

Through these narratives, developed from their individual experiences, the participants express their reservations about the typical studio structure and the problems that are typically addressed.

It is apparent through history and literature reviews that the studio has been the backbone of the architectural education process for centuries; it remains in this foundational position as evidenced by the interviews. All participants agree that the exposure to sustainability has to come through the studio culture and process. Some participants feel that the studio structure, as it stands, is established and must be worked around.

General Issues

To convey an accurate portrayal of their individual perspectives about issues within architectural curriculum, many participants referenced various elements that they feel are important in discussing change agents. While each participant does not address each issue reviewed below, individuals each reflect on topics that they felt were most important to implementing change.
When asked about course content, many subjects took this opportunity to revisit the topic of **disparate subjects within the curriculum**. Though existing courses are created to look in-depth at necessary topics such as structures, history and materials, participants also feel that this separation was an excuse for also selectively separating sustainability into a specific topic. Larry sees this separation in his program, claiming, “It’s the same old crippled notion about, ‘Okay, when we get to that part we’ll bring you in, and you do a lecture.” As Baxter notes, “I think sustainability can be brought into every course. I think it’s very easy to make passing reference to how this or that building does or does not do some things related to the issues of sustainability.” These statements illustrate Baxter’s belief that sustainability is fundamental to design, and is not a subcomponent of design; how it is seen within the bigger field is a matter of personal perspective.

Jared reiterates Baxter’s notion of **personal perspective** by sharing, “I teach a seminar on green building. Interestingly, the seminar I teach is listed as a professional practice seminar.” This syllabus is included in Appendix E. Jared’s statement communicates his personal understanding of how sustainability is typically incorporated into architecture programs, and through what courses; primarily sustainability is seen in design, environmental control courses, or specific sustainability seminars. Though his class is indeed a seminar, it is categorized as a professional practice seminar, which typically addresses codes, contracts and licensure. Instead, Jared perceives green building topics through a practical lens highlighting contemporary practice issues also reflecting his student population and their needs. This illustrates the importance of individual perspective regarding the implementation
of sustainability in architectural education, and posits that this integration can be accomplished in any context if the faculty members are interested.

Being at a program recognized to integrate sustainability successfully, and having been on faculty for over 40 years, Baxter uses his extensive experience with different courses and instructors to build his theory of integrating sustainability themes appropriately across courses. Having thought about this topic before, he outlines scenarios for courses that may not be commonly viewed as applicable for addressing sustainability, such as theory or structures. “You could look at this through a sustainability lens and you could find six or eight or ten things going on in any course. In a structures course, it would be easy enough to talk about the material sourcing and it’s implication for the environment, or for the economy, or for the creation of jobs and the socio-economic impact. Even in a philosophy course you could talk to how different architects chose to include or not include sustainability. If you get outside of architecture, and you go to some of the other inspirations for the so-called philosophy courses, Kierkegaard or something like that, there are ways to draw connection between the basis of those rational constructs and the significance of sustainability.” Baxter summarizes his feelings succinctly with, “It’s just a choice.” In Baxter’s view, a green lens could easily be laid over each element in the architectural curriculum to specifically look for insights and applications regarding sustainability.

Other participants echo this perspective of permeation. Barry, building on his experiences at his western institution, referenced using Ed Mazria’s Architecture 2030 as a method for formalizing sustainability integration across all courses. Barry explains, “In that,

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5 See www.architecture2030.org
we try to help cover sustainability issues throughout our curriculum - in all the lecture courses, seminars, and studios. I think that’s fairly unique among architecture schools. I don’t know that anybody else is as committed as we are to that total integration.” Barry’s experience parallels Baxter’s, illustrating success through dedication of the faculty.

Paul, who typically teaches early in the undergraduate years at his west coast program, meets the topic of course content with enthusiasm. While many of the other participants work primarily with graduate students, Paul feels that he has another set of issues in teaching students that have not developed the breadth or depth of knowledge seen at the graduate level. “I can’t really start using tools that have to do with U-values and such because they don’t really know anything about those metrics yet in practice.” Instead, he focuses on less technical knowledge at the beginning. “Introduce the intuitive elements first, as part of their foundational training. They don’t need an extensive understanding to start incorporating and understanding what makes sense.” While some participants such as Baxter and Jared speak about the integration of sustainability within different topics horizontally across architectural curriculum, Paul’s experience focuses more on the different experience levels of the students vertically through the program.

Paul’s narrative illustrates how various levels of knowledge, and scaffolding within different years of the program, can begin to be infused with sustainability themes. This approach provides a breadth of information at a basic level. “I give them an introduction on why sustainable architecture is important, climate change and all the issues. Then, we look at climate analysis, then maybe solar geometry. Then maybe we talk about materials. Include local materials and recycled content, then maybe we talk about water, like water
conservation. Then we cover energy, of course. But the key thing is that they don’t know anything about the technical methods. They don’t know anything about heat transfer.”

While some participants feel that some sustainability issues, specifically any interdisciplinary themes that might be addressed, should be held off until later in the curriculum, Paul believes that there is benefit to introducing students to environmental themes early. His experience with undergraduate students has evolved his approach to “have them start getting some information as early as possible so that they can start applying these concepts in their studios. They actually – not all of them, but many of them – do start implementing these sustainability concepts that they learned in second year through their third, fourth and fifth year.”

An alternative perspective on how to integrate sustainability into course content is to **refocus the goals of the courses.** This is a bigger change, calling essentially for refocusing and restructuring the educational process. Peter expresses a different set of potential priorities. “Education goals should address the experience of the students building something that can actually be manufactured, can be environmentally friendly, and students can work with the economics of it is produced.” Peter’s perspective is based on his extensive experience as an educator, a researcher and a practitioner engaging the manufacturing world, and allowing his students to access those worlds. This quantifiable approach to goals also brings the whole of the curriculum to another level of accountability. Also, Peter’s broad perspective addresses the influence of architecture on other concerns beyond the traditional boundaries, expanding to the creation of jobs, integration with manufacturing, and beginning to understand the socio-economic impact, widening the margin of concern and influence.
As noted in the previous section addressing course content, many participants view the approach to sustainability within curriculum and courses as separate, likely related to visiting experts and specific courses. Jared, however, references his personal experiences at programs and his knowledge of programs at other schools, as well as some of the nuances surrounding the topic, noting, “I don’t think having dedicated courses means it’s treated as an add-on.” In other words, while some faculty may see a separate sustainability course as a disservice to the topic, others feel that separate courses can be treated as integral to the program, just as structures, history and theory are required. Jared’s belief is that sustainability can be incorporated in many different ways; it is difficult to make a blanket statement about how the topic is included based solely on it being a separate course. He says, “The distinction between it being integral and an add on is an important thing to talk about. But I don’t think that just because a sustainability course shows up as a separate course means that it is somehow less integrated.” This statement reflects Jared’s intimate experience with this situation, as his course is a separate sustainability course. It directly describes his course and his desire to not be seen as fringe, or not integral. It also communicates a personal preference for individual and specific courses to allow for both breadth and depth in coverage and concentration.

Ned echoes concerns about depth from his experience saying, “Most programs are dealing with the sustainable issues which are simple. Materials. Maybe, if the project is a community design, they may encourage the buildings to be close together. But the essence of making an energy efficient building is not being addressed.”
Peter has similar concerns, but specifically related to sustainability at the construction detail and fabrication level. “You start at a certain point and you start looking. Well, how is this piece attached? How much weight does it take? How much wind load does it take? How do I work with the fenestration that’s there? Is it energy conserving? Is it reflective? Is it this? Is it that? And I am actually developing an attachment system that has a broad enough possibility of use that I can adapt to the thousands of things that are going on in designs and existing buildings. This is major.” In other words, looking at a different scale of studio project, such as addressing specific details, greatly diverges from the standard scope of a normal studio project and allows for a significant increase in depth of exploration. From Peter’s perspective, this is where the most impact can be had in sustainability; a problem that at first seems too simple to be addressed in a studio may be in reality extremely complex, rich and valuable at a deeper level.

Other participants share examples of how sustainability is seen to be disparate, not only generally separated as a specific concentration, but also funneled into a specific topic heading. Paul notes, “The main way in which it’s been introduced or taught is through a required environmental controls class. It’s been focused on that specific phrase, ‘environmental controls’ in buildings. How do we control the relationships of the building with the environment that surrounds it?”

Paul’s experience has facilitated the development of his own theory on how support courses can be better integrated with studio, as previously expressed as a problem by Baxter and Jared. Paul believes that an established connection between studio and support courses is important and integral to the implementation of sustainability themes in studio. He
describes the pairing of a lecture course with studio, which are both taught by the same instructor, and reference each other in projects and class sessions. “The students actually implementing what they’re learning in the lecture in studio projects.” As an example, he tells students, “You can implement the concept that you learned in lecture to try to reduce emissions in your studio project. So there is always an attempt to integrate the lecture with projects.”

Larry also views these cross-course linkages as important, sharing his efforts in attempting to bridge technology with studio in his own program. “The notion of technology in studio is oxymoronic,” he claims, revealing his view on the traditional approach to sustainability, in line with the separation voiced other participants. Not currently teaching studio, his experience has to focus on projects within his environmental controls course – the traditional course for engaging energy efficient themes. “My courses are all hybrid, so Monday I lecture, and Wednesday they do simulation work on their studio project.” Larry takes the incorporation of sustainability in studio into his own hands, in the scope of curriculum that he can realistically impact – specifically, his environmental controls course. Based on his experience, it is his approach that if his studio faculty does not bring sustainability issues into their studios to address, he brings the studio project out of the studio setting and into his lecture, similar to Paul’s approach of lecture-studio integration. Paul reiterates, “So if we have them understand that the information that they’re receiving in lecture is directly applicable to a studio, I think that is making it more useful.”
Another issue beyond the integration of course content and course or curriculum structure is the **method in which students are engaged** with green building themes. Baxter notes, “We have to acknowledge in the end that it can’t be an addition to what folks do; it has to somehow be an opportunity for transformation of *what* they do.” Ned offers a similar perspective, concentrating on a leverage point for transformation of design process and broader inclusion: “I don’t claim there’s just one way. But the question is, what would be a powerful way of attacking this problem?”

Participants agree that their **individual approaches** to architectural education and their inclusion of certain methods is a significant contribution to their reputed success. For example, Paul notes, “I think students should also know how to use digital and analog tools. Both are important. It’s like, just because we’re using computers, doesn’t mean we can’t use a pen anymore, right?” Paul is expressing his belief in a well-rounded approach to sustainable design, using both technical and intuitive learning and measurement methods.

The types of projects designed are a popular technique to address sustainability topics in courses. Many participants express the importance of using real world problems to engage students, pulling them out of the common theoretically-based academic setting. Barry has developed a relationship with an environmental education program to serve as a client for his projects. This element enables the students to begin to mix education and personal interactions through environmental aspects, expanding traditional building design concerns and criteria. In Barry’s experience, providing a “tangible project that the students know is real and feasible and allows them to understand through coursework that they could really
make a difference by excelling in their work.” This is one potential way of implementing active education and integrating sustainability themes.

Paul, who also gravitates toward tangible projects, recounts a similar method. “I have them do a project where they build a small meditation capsule. They build and monitor this capsule, and the objective here is to try to achieve thermal comfort with a reduced carbon footprint. So they’re designing a building, a small building, and they’re implementing what they learned in class.”

Peter feels strongly about the incorporation of real-world projects, specifically those involving the manufacturing industry and mass production, compared to other coursework that addresses theoretical projects and problems where “students do things that have absolutely zero relevance.” In Peter’s experience, these real-world issues also allow interdisciplinary teamwork to be brought to the students. “There’s a tangible goal at the other end, and I submit that today these goals - these places we need to be at - are imperative. More important than ever. We have got to go and produce.” Larry summarizes the perspectives of the participants well when he says, “Studio is still in the Ecole de Beaux Arts producing of the solution that goes in a drawer, and nobody ever has to look at it again, and there’s no real accountability attached to it.”

Bridging the academic-real world gap happens in other ways as well, for instance by exposing students to conferences or activities off campus whenever possible. Paul tries to incorporate outreach efforts into his projects, allowing both projects and students to leave the classroom, enabling the students to create a larger frame of reference. He says, “I don’t like projects just sitting around the classroom. So we do community work. It’s one of the ways
in which they can understand that, ‘Hey, this design can be more than just this thing in my portfolio.’” These various efforts to expose students to real world experiences helps to broaden the scope for the students, situating their specific green building problems in a larger world realm.

*Accreditation Criteria*

The issue of criteria, when broached, primarily led participants to talk about the NAAB requirements for program accreditation. Baxter sees any integration at this higher level paralleling many of the insufficient integration strategies seen in some architectural programs. He says, “Nobody’s looking at it as a systemic thing. It’s still piecemeal and not being done very well.” Larry supports this position saying, “Everything - all proposed changes and inclusions - got softened. They’re so afraid of operationalizing anything in the criteria.” Baxter agrees with this sense of hesitancy saying, “Because so much of the NAAB process in the end is political, nobody there wants to cross wires with the 1,000s of prima donnas that are teaching in the schools around the country, so it’s always written up in some foggy way that says schools can interpret and operate in their own way. What that’s really doing is just saying politically, ‘We’re not going to go too far because we don’t want to tick off too many people.’” Ned also supports this perspective: “They are not changing any requirements. So that means that in the foreseeable future, there’s not going to be any requirement; schools can do what they want.”

There is a question within discussions as to whether the inclusion of sustainability themes into the **NAAB requirements** would matter on the ground in how programs moved forward, and the majority felt that it would not. Larry draws on an experience from a review
of his program a few years before, in which the program did poorly, and his faculty discounted the review, attributing the poor score to the accrediting committee not appreciating what they were doing; they then proceeded to do well on the following visit. Larry says, “The reviews were worthless, actually, and the faculty said, ‘See how good we are?’ So the NAAB process is a double standard. When it doesn’t work for us then we don’t believe in it. But when it validates us, then that’s good.”

When asked, Paul does not have a perspective to share on the issue of NAAB criteria, powerfully illustrating that whatever happens regarding sustainability in the criteria is not overly important to him. Barry is also very doubtful as to whether any NAAB revisions matter to the integration of sustainability in architectural education. “I look at NAAB as plan checkers. I don’t put a lot of credibility into the process.” He goes farther saying, “They just make sure that we all teach architecture, basically. I think that’s their job to make sure that people can get licensed. I don’t think it’s their mission to save the world. Maybe it should be, but that’s not for me to decide.” Baxter says his faculty views the requirements as a set of guidelines, mostly “a check sheet, as a touchstone, as a reference, but not as an absolute mandate.” Given these varying perspectives, it is a common view that sustainability integration can happen with or without inclusion in the NAAB requirements.

5.2. Axial Coding: Categorizing the Issues

The previously reviewed open coding process consisted of a detailed examination and reorganization of data, resulting in the creation of six related themed categories. The second stage of axial coding digs deeper into the nuances and detail of the emergent data, removing the data bits from specific contexts and interviewees, and viewing each individual piece of
data as one element of a body of evidence. As the axial coding phase progresses and comes to a close, the data is re-contextualized through a continuous process of constant comparison, synthesis and re-categorization.

The relationships between the emergent categories that develop through the open coding process are analyzed by exploring Causal Condition, Phenomenon, Context, Intervening Condition, Action/Interaction, and Consequence as described by Strauss and Corbin (1998). The Intervening Conditions of each category answer the questions of why, where, how come, and when. Actions/interactions of categories look at by whom and how. Consequences then look at ‘what happens’ in light of these actions/interactions (Strauss and Corbin 1998).
Charmaz (2006) notes that the point of axial coding is for researchers to develop a framework to apply to their data gathering. “Those who prefer simple, flexible guidelines – and can tolerate ambiguity – do not need to do axial coding.” She also notes that implementing axial coding may actually be detrimental to the exploration of data in that it does apply an analytic frame to the data, which can potentially limit “what and how researchers learn about their studied worlds and, thus, restricts the codes they construct.”

In this section, six identified phenomena are identified as strongly related to the integration of sustainability themes in architectural education:

- Cross-campus Involvement
- Culture and Tradition
- Framework Development
- Student Initiatives
- Faculty Involvement
- Curriculum Integration

Each of these phenomena is explored individually by looking at a number of developing themes (contexts), outlined in an initial table. Following each table, the contexts are investigated individually by looking at the intervening conditions, actions, and consequences.
5.2.1. PHENOMENA 1: Cross-campus Involvement

Table 10: Phenomena 1

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cross Campus Involvement</td>
<td>1.1 Traditional architecture programs are isolated from other colleges on campus.</td>
</tr>
<tr>
<td></td>
<td>1.2 Architecture programs are traditionally full and rigorous, eliminating the possibility of additional electives beyond the required minimum.</td>
</tr>
<tr>
<td></td>
<td>1.3 Sustainability themes are not typically integrated into the required general education courses required of architecture students.</td>
</tr>
</tbody>
</table>

- **Context 1.1:** Traditional architecture programs are isolated from other colleges on campus.
  
  - **Intervening Condition:**
    - Experiential background through both personal experience in programs and observing as a faculty member; traditional structure and culture of architectural programs
  
  - **Action/Interaction:**
    - Participants experienced a growing understanding of the knowledge base needed to integrate and implement sustainable design strategies.
    - Students questioned their contribution to and impact on other factors in the built form and in society.
    - Interdisciplinary themes are found to be necessary in sustainable design projects.
Consequence:

- Certificate programs have been established at some participants’ universities.
- Faculty members actively seek out other academic programs to partner with on courses or initiatives.
- Outside experts are brought in to contribute to studio as appropriate. This may be as a guest lecturer, critic, or reviewer.

Context 1.2: Architecture programs are traditionally full and rigorous, eliminating the possibility of additional electives beyond the required minimum.

Intervening Condition:

- Experiences in architecture programs as students and faculty, both as participants and observers; exposure to accreditation reviews and standards.

Action/Interaction:

- Participants understand the need for the contribution of other expertise to provide additional base knowledge in courses.
- Though architecture is viewed as holistic, participants felt the breadth is confined by time and scope within the courses offered by individual programs.
Consequence:

- Teachers bring in experts as appropriate to contribute additional information to the students. This includes areas such as energy efficiency, culture, sociology and psychology.
- Faculty members assign additional targeted readings and experiences to supplement the narrow scope covered in their curricula.

**Context 1.3: Sustainability themes are not typically integrated into the required general education courses required of architecture students.**

Intervening Condition:

- Experiences in architecture programs as students and faculty, both as participants and observers; exposure to accreditation reviews and standards

Action/Interaction:

- Participants see that the supplemental information brought into courses is rarely a result of required general education courses.
- Faculty members understand the need for the contribution of other expertise to provide additional insight not gained elsewhere in classes.

Consequence:

- Teachers bring in experts as appropriate to contribute additional background information to the students, often to contribute to a theoretical framework or for practical implications.
- Faculty members assign supplemental readings and experiences broaden the exposure of students to sustainable themes and topics.

5.2.2. PHENOMENA 2: Culture and Tradition

Table 11: Phenomena 2

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Culture and Tradition</td>
<td>2.1 Participants experienced, either as students or peer faculty, educational <strong>processes focusing primarily on form-giving</strong>.</td>
</tr>
<tr>
<td></td>
<td>2.2 Participants perceived the <strong>isolation of architecture students</strong> from other concentrations on campus.</td>
</tr>
<tr>
<td></td>
<td>2.3 Traditional architectural educators <strong>perpetuate established philosophies</strong>, replicating the ways in which they were taught themselves.</td>
</tr>
<tr>
<td></td>
<td>2.4 <strong>Reinforcement of status quo</strong>, subjective educational process by peers and assessment bodies.</td>
</tr>
<tr>
<td></td>
<td>2.5 The <strong>studio is emphasized</strong> as the spine and foundation of architectural education.</td>
</tr>
<tr>
<td></td>
<td>2.6 The <strong>architect is revered</strong> as a solitary designer and individual icon in the design culture.</td>
</tr>
<tr>
<td></td>
<td>2.7 <strong>Master/apprentice</strong> is historically the model of architectural education, and is still echoed in the process today by some faculty.</td>
</tr>
</tbody>
</table>

- **Context 2.1:** Participants experienced, either as students or peer faculty, educational **processes focusing primarily on form-giving**.
  
  - **Intervening Condition** (why, where, how come, and when):
    
    - Experiential and educational backgrounds including the exposure to studio and differing architectural programs
• **Context 2.2:** Participants perceived the *isolation of architecture students from other concentrations on campus.*

**Intervening Condition:**

- Experiential and educational backgrounds including the exposure to studio and differing architectural programs

**Action/Interaction:**

- The process of design and contributors to the building process were considered for educational importance and valued by participants.
- Participants felt that the isolation of students from broad exposure to other fields and contexts was detrimental.
Professional isolationism was felt within the universities, embodying the notion of separate ‘Ivory Towers’ on the same campus.

Participants reflected on the knowledgebase currently used and ideally required in the design process, finding it primarily dependent on personal background and experience, which is traditionally highly regulated and narrow within architecture departments.

Consequence:

- Allowing students access to other disciplines and trains of thought required a cross-disciplinary approach, not only among disciplines in the same college but across colleges on the same campus.
- Faculty made concerted efforts to engage students in activities off campus such as conferences, charrettes and outreach endeavors.
- Strategic efforts were made to develop or become involved with interdisciplinary courses.

Context 2.3: Traditional architectural educators perpetuate established philosophies, replicating the ways in which they were taught themselves.

Intervening Condition:

- Experiential and educational backgrounds including the exposure to studio and differing architectural programs

Action/Interaction:

- Participants reflected on the way in which they were taught during their architectural education.
The applicability of different educational approaches was individually assessed based on the personal experiences of the participants.

Possible teaching philosophies were evaluated in light of the current professional environment and the needs of the field.

- **Consequence:**
  - Educational approaches were either modified or fine-tuned to fit better with the current state of the profession, as individually seen by the individual participants.

**Context 2.4: Reinforcement of status quo, subjective educational process by peers and assessment bodies.**

- **Intervening Condition:**
  - In-depth exposure to educational (curriculum and department) structures, as well as prevailing assessment methods, or lack thereof.

- **Action/Interaction:**
  - Educators found the formalized assessment methods unequipped to address contemporary sustainability issues in education.
  - Participants noted the lack of self-reflection within their faculty bodies regarding self-assessment.
  - A breakdown in the educational process was identified through the lack of self-reflection by faculty groups and stakeholder groups.
Consequence:

- Participants are beginning to question measurables regarding what is being taught, primarily at the individual level.
- Though participants are also interested in creating assessment tools for their faculty and for the educational process across programs, the concentration is on individuals or a smaller group for ease.
- Different movements are underway attempting to define different levels of accountability for programs and projects, and many of the participants are involved with these initiatives.

Context 2.5: The studio is emphasized as the spine and foundation of architectural education.

Intervening Condition:

- First-hand experience of the studio culture, both as student and instructor; participation in faculty meetings

Action/Interaction:

- Participants reflected on their first-hand studio experiences as students and faculty, as well as the observers of other students in the studio environment.
- As faculty members, subjects participated in the cultivation of and emphasis on studios in the curriculum.
- All participants agree that the studio is fundamental and necessary to the education of architecture students.
Consequence:

- Faculty members try to incorporate all desired sustainability themes into the studio setting.

Context 2.6: The architect is revered as a solitary designer and individual icon in the design culture.

Intervening Condition:

- Immersion in the established design culture of Star Architecture and the singular genius

Action/Interaction:

- Participants came to understand that the process of creating architecture is not singular, but team based.
- The creation of a piece of “art,” or an object placed in a landscape, has been set aside for design that acts as a organism, working in conjunction with the surrounding systems.

Consequence:

- Teamwork and interdisciplinary projects become more emphasized in individual courses and curricula.
- Larger natural systems are explored and integrated into the design process to work in partnership with the building systems.
• **Context 2.7: Master/apprentice** is historically the model of architectural education, and is still echoed in the process today by some faculty.

  o **Intervening Condition:**

    - Personal experience with any version of the master/apprentice relationship, either directly or as an observer

  o **Action/Interaction:**

    - As participants became more deeply involved in education, they began to critically reflect on the educational process and developed standards within.
    - As part of a self-reflection process, there was critical assessment of individual instruction methods in light of the goals of education and established methods.
    - Participants began to compare the changing needs of the profession with the current methods of education, and subsequently to question the scope of responsibility to their students.
    - An understanding of the new context within the profession was integrated as feedback into the development of their educational methods.

  o **Consequence:**

    - Participants sought to actively empower students to find their own paths and interested through their education.
• Critical thinking exercises were incorporated to assist students in questioning information provided as fact.

• Faculty began to function as facilitators, facilitating growth rather than simply passing on necessary information.

5.2.3. PHENOMENA 3: Framework Development

Table 12: Phenomena 3

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 Framework Development</strong></td>
<td><strong>3.1 Simplified view</strong> of elements and considerations are involved in current studio design projects.</td>
</tr>
<tr>
<td></td>
<td><strong>3.2 Issues</strong> for consideration (climate, structure, materials, teammates, goals, resources, etc) are given to the students <strong>void of context</strong>.</td>
</tr>
<tr>
<td></td>
<td><strong>3.3 The building is an object</strong> unto itself that can pull from and contribute to its surroundings as needed.</td>
</tr>
<tr>
<td></td>
<td><strong>3.4 The creative process is unable to be defined</strong> or guided; it is without structure and ‘magical.’</td>
</tr>
<tr>
<td></td>
<td><strong>3.5 The design process is typically linear</strong> progressing from programming, to adjacencies, through extrusion from the plan, manipulation of form, to the engineer, and into final documents.</td>
</tr>
<tr>
<td></td>
<td><strong>3.6 Subjective assessment</strong> of products and <strong>unclear learning objective</strong> are primarily implemented in courses.</td>
</tr>
<tr>
<td></td>
<td><strong>3.7 Extensive terms</strong> and methods for addressing sustainability are being used in both academia and the profession, and few of them have a concrete definition.</td>
</tr>
<tr>
<td></td>
<td><strong>3.8 Legislation</strong> regarding any energy efficiency measures or green building implements is not regularly included in courses.</td>
</tr>
</tbody>
</table>
• **Context 3.1:** *Simplified view of elements and considerations are involved in current studio design projects.*

  o **Intervening Condition:**
    
    ▪ Experienced the actual building process, overlaid with holistic concerns of sustainability

  o **Action/Interaction:**
    
    ▪ As their interest in sustainability themes grew, faculty each actively sought to better understand an acceptable process and factors necessary for sustainable design.
    
    ▪ Participants felt that by eliminating and simplifying so many issues into glossed-over issues in the studio, students would perpetuate these methods in practice and create additional environmental problems from built form.
    
    ▪ As various and seemingly endless considerations were perceived to be needed for inclusion into the design process, the complexity of the problems became apparent.

  o **Consequence:**
    
    ▪ Broadening the scope of information provided to enable students to understand the enlarged scope of influences and impacts of their decisions.
    
    ▪ Provide an understanding of the major systems at a global scale.
• Context 3.2: Issues for consideration (climate, structure, materials, teammates, goals, resources, etc) are given to the students void of context.

  o Intervening Condition:
    ▪ Experienced the actual building process, overlaid with holistic concerns of sustainability

  o Action/Interaction:
    ▪ Participants began to understand the complexity of the problem and sought to expose students to various established models and frameworks to help organize the issues in a coherent manner.
    ▪ Through various categorization methods, participants felt students needed to better understand which methods and goals might be easiest to achieve.
    ▪ Students needed additional organization and information.

  o Consequence:
    ▪ Faculty developed frameworks and reference points for students to use in their current design process and modify as they moved forward.
    ▪ Students were provided with various frameworks and alternatives for personal assessment and greater control of their design.
    ▪ Faculty began to prioritize and focus on selected strategies within courses.
• **Context 3.3:** *The building is an object unto itself that can pull from and contribute to its surroundings as needed.*
  
  o **Intervening Condition:**
    
    ▪ Increased understanding of the integrated design process
  
  o **Action/Interaction:**
    
    ▪ As part of their teaching development, participants analyzed what had traditionally been included within different aspects of projects, and what scales had been addressed.
    
    ▪ The design, along with the necessary conversations and contributions incorporated into the design process, was seen to be more complex than what was being represented in courses.
  
  o **Consequence:**
    
    ▪ Participants seek out exercise to broaden the context and scope of awareness in projects to include partners and stakeholders.
    
    ▪ Interdisciplinary efforts are being increased in courses and curricula.
    
    ▪ Faculty members are increasingly approaching design problems as systems projects, aiming to also incorporate neighboring systems in the design.

• **Context 3.4:** *The creative process is unable to be defined or guided; it is without structure and ‘magical.’*
Intervening Condition:

- Understanding the issues involved with sustainability and green design; exposure to traditional teaching of the design process

Action/Interaction:

- Participants reflected on the standard, nebulous design process and the considerations that were typically included.
- When planning courses, participants began to specifically consider how much trial and error could be fit into studio hours.
- Critical exploration of the notion of product versus product occurred, reviewing the context and benefits of each.
- As faculty members address how to communicate and teach different individual students, looking at the best methods for different personality types, there is generally a belief among participants that creativity can be taught in parallel to assessment strategies.

Consequence:

- Faculty created a roadmap outlining potential considerations as a framework for students to use and manipulate as they progress through their careers.
- Emphasis was put on clarifying conceptual ideas as the basis for designs.
• **Context 3.5:** *The design process is typically linear* progressing from programming, to adjacencies, through extrusion from the plan, manipulation of form, to the engineer, and into final documents.

  o **Intervening Condition:**
    ▪ Understanding new demands on the design process, growing number of contributors, and complexity

  o **Action/Interaction:**
    ▪ Understanding that students need to function in the profession, participants continually assess the demands of the profession and how to best prepare students for them.
    ▪ Because each individual project is not standard, and each site is different, etc., multifaceted considerations need to be addressed within the design process simultaneously.
    ▪ Possible aides were explored to assist in congruent thinking in design decisions.

  o **Consequence:**
    ▪ Implementation of versions of Building Information Modeling (BIM) to enable multiple factors to be addressed at once in the design process.
    ▪ Interdisciplinary teams and exposure are increasingly encouraged.

• **Context 3.6:** *Subjective assessment of products and unclear learning objectives are primarily implemented in courses.*
o **Intervening Condition:**

- Experiencing the subjectivity of architectural and design assessment; participation in faculty meetings and accreditation reviews

o **Action/Interaction:**

- Faculty members were exposed to assessment techniques of various organizations used in-house and by third-party verifiers.
- Participants had discussions with peer groups at other universities to compare what everyone was doing, by what standards, and at what level.
- Faculty participated in discussions about consistency and assessment with administration and faculty at their home universities.

o **Consequence:**

- Initiatives are underway, both at individual schools and across programs, to establish references and touchstones for validity and verification.
- Energy issues, thresholds, targets, etc., are being selectively overlaid on the current subjective assessment process.

**Context 3.7: **Extensive terms and methods for addressing sustainability are being used in both academia and the profession, and few of them have a concrete definition.
o **Intervening Condition:**

- Familiarity with an abundance of terms that proliferate within the field, and students that have no small frames of reference regarding scales and scopes for the terminology.

o **Action/Interaction:**

- Participants emphasize their inclination to use qualifiers and measurable criteria (instead of blanket terms) with students to ensure that students understand the intent of the conversation.
- Conversations among faculty are similar, in that non-involved faculty may use terms in the wrong context or without full comprehension of the meaning and scope of the term.

o **Consequence:**

- Participants understand a variety of terms, and each has their own philosophies on which term to use when. The importance is on defining each term in context at the time and making that instance explicit between those involved in the conversation.

- **Context 3.8:** Legislation and policy regarding any energy efficiency measures or green building implements is not regularly included in courses.

o **Intervening Condition:**

- Familiarity with issues addressed in studio, awareness of energy efficiency legislation being passed and updated regularly.
- **Action/Interaction:**
  - Participants understand the importance of energy efficiency legislation but are unsure how it fits into the architectural curriculum.

- **Consequence:**
  - Legislation is brought into studio and courses in parallel with building codes and other rules of practice.

### 5.2.4. PHENOMENA 4: Student Activities

Table 13: Phenomena 4

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Activities</strong> 4</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Student involvement in creating the culture of the school independent of their involvement in studio.</td>
</tr>
<tr>
<td>4.2</td>
<td>Creation and governance of campus or school environmental organizations by students.</td>
</tr>
<tr>
<td>4.3</td>
<td>Students show interest and request increased sustainability offerings.</td>
</tr>
<tr>
<td>4.4</td>
<td>Students are traditionally educated through a series of theoretical design projects in the studio setting.</td>
</tr>
<tr>
<td>4.5</td>
<td>Individual student populations are diverse and specific.</td>
</tr>
<tr>
<td>4.6</td>
<td>Students engage in outreach efforts.</td>
</tr>
<tr>
<td>4.7</td>
<td>Students engage in design-build projects in which they participate throughout both phases.</td>
</tr>
<tr>
<td>4.8</td>
<td>Architecture students are rarely involved in research at any level in their programs, nor is there often the opportunity for involvement.</td>
</tr>
<tr>
<td>4.9</td>
<td>Students engage in occasional travel field trips.</td>
</tr>
</tbody>
</table>
• Context 4.1: Student involvement in creating the culture of the school independent of their involvement in studio.
  
  o Intervening Condition:
    ▪ Experience with and exposure to different student bodies, as well as shifting school cultures
  
  o Action/Interaction:
    ▪ Participants understand the potential impact of the student population.
    ▪ Understanding the potential of a motivated student body, participants try to capitalize on the interests of their students.
  
  o Consequence:
    ▪ Participants are providing students increased opportunities for leadership when possible.
    ▪ By serving as a facilitator and guide, faculty members are fostering student ownership in their education.
    ▪ Increased choices within the field, in association with complementary areas, are empowering students to choose their own professional trajectory.
    ▪ Faculty members are further engaging students in the green building movement by validating their interests.

• Context 4.2: Creation and governance of campus or school environmental organizations by students.
• **Intervening Condition:**
  - Experience with and exposure to different student bodies

• **Action/Interaction:**
  - Many faculty members understand the possible impact of the student populations.
  - Participants try to capitalize on the existing interests of the student body and encourage leadership.

• **Consequence:**
  - Students become involved with various programs on campus, and architecture students engage with other fields as a result.
  - Additional involvement with various student groups and populations fosters professionalism, leadership, advocacy, etc., in architecture students and better prepares them to participate in the profession upon graduation.
  - Through this additional involvement, there is often increased awareness of organizational strategy and business development.

• **Context 4.3:** *Students show interest and request increased sustainability offerings.*

  • **Intervening Condition:**
    - Experience with and exposure to different student bodies; involvement with faculty bodies
o **Action/Interaction:**

- Faculty experience and understand the possible impact of the student population on courses and school programs.
- Reflecting on feedback from students regarding current offerings, participants begin to identify potential gaps in curriculum needing addressed.

o **Consequence:**

- Sustainability concentrations and minors are developed both within the schools and across campus.
- Increased interaction with other units on campus is developed, capitalizing on existing complementing offerings.
- Through additions and increased offerings, the focus of the curriculum can be shifted.

- **Context 4.4:** *Students are traditionally educated through a series of theoretical design projects in the studio setting.*

  o **Intervening Condition:**

    - Personal experience with a variety of studio courses as both student and instructor
    - Experience with and exposure to different student bodies
    - Background and involvement as member of faculty body
Action/Interaction:

- Participants engaged in reflections on studio offerings in light of the changing context of professional practice.
- Comparisons were made between the implementation of practicality and theory within the educational setting.
- Faculty became familiar with and gained a deeper understanding of their specific student populations.
- Participants perceived educational value from participating in third-party competitions.
- Internal competitions and validation was created to alter the studio setting.

Consequence:

- Faculty began to look for opportunities to incorporate real projects and clients into the studio setting.
- Participants increase the emphasis on pragmatic concerns within course outlines.
- Competitions are used in courses to engage students, highlight desirable metrics, values, etc.

- Context 4.5: Individual student populations are diverse and specific.

Intervening Condition:

- Familiarity with specific student bodies and the awareness of student bodies in other contexts
Specific knowledge of the local culture and place where the school is located

- **Action/Interaction:**
  - Faculty members became familiar with and reflected on the specific personalities of their student body (background, socioeconomic, history, interests, etc).

- **Consequence:**
  - Support and energy from the student body is engaged through the development of sustainability initiatives.
  - Participants and other faculty supported their student body’s interests by incorporating sustainability themes into coursework.

**Context 4.6: Students engage in outreach efforts.**

- **Intervening Condition:**
  - Exposure to student outreach efforts as independent initiatives, coursework, or extra-curricular activities; involvement with faculty advisors

- **Action/Interaction:**
  - Participating faculty began to explore ways to encourage interaction between students and various populations off campus.

- **Consequence:**
  - Engaging in outreach efforts improved camaraderie, support and increased enthusiasm for both students and faculty.
- Enhanced team building skills resulted from intense teamwork.
- Students experienced real-world situations similar to those found in the profession, preparing them for life after graduation.
- Students developed an increased appreciation of social factors in the realm of sustainability with outreach efforts into specific communities.

**Context 4.7:** Students engage in *design-build projects* in which they participate throughout both phases.

- **Intervening Condition:**
  - Exposure to students in a design-build process, either through coursework or as an extra activity

- **Action/Interaction:**
  - Faculty participated in both self-assessment and course assessment, by both faculty and students, reflecting on impacts and knowledge gained through the design-build process.

- **Consequence:**
  - Existing relationships and initiatives that could possibly lend themselves to design-build projects were explored.
  - New design-build initiatives were developed to engage students.

**Context 4.8:** Architecture students are rarely involved in *research* at any level in their programs, nor is there often the opportunity for involvement.
o **Intervening Condition:**
   
   - Experience with standard architectural curriculum structure, or alternatives that begin to include research opportunities
   - Involvement on a faculty body

o **Action/Interaction:**

   - Through exploring various teaching methods, participants began to acknowledge the importance of direct student experiences and data gathering.

o **Consequence:**

   - Students are encouraged to travel to conferences and presentations.
   - Students are provided opportunities to attend workshops and professional sessions.
   - Students gain practical data gathering experience to implement in the workplace after graduation.
   - Publications and supplements for resumes are developed in light of the additional experiences.

• **Context 4.9:** *Students engage in occasional travel field trips.*

  o **Intervening Condition:**

    - Experience with internationally- and locally-focused travel experiences as individual, student and faculty
○ **Action/Interaction:**

- Viable fieldtrips within a realistic travel radius from the campus were assessed.
- Significant works that would greatly benefit the students to experience in person were identified.
- Different cultures, climate zones, densities, contexts and strategies are valued from an educational context.

○ **Consequence:**

- Faculty established a series of recurring or standard fieldtrips to increase student exposure to desired themes.
- Student groups engaged in travel to other countries for visits or extended study opportunities.

### 5.2.5. PHENOMENA 5: Faculty Involvement

Table 14: Phenomena 5

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Faculty Involvement</td>
<td><strong>Individual faculty members feel pressure</strong> that they are the sole individuals responsible for educating on green building themes.</td>
</tr>
<tr>
<td>5.2</td>
<td>Faculty believed that the issues of sustainability were more <strong>philosophical</strong> than a specific subject.</td>
</tr>
<tr>
<td>5.3</td>
<td>Rapidly growing information <strong>challenges faculty to remain informed</strong> and relevant in an area where there may be a large learning curve.</td>
</tr>
<tr>
<td>5.4</td>
<td>The <strong>depth and accuracy of sustainability knowledge</strong> by faculty members new to the movement was noted as a concern.</td>
</tr>
<tr>
<td>5.5</td>
<td>There is a common model in architectural education that <strong>separates technology faculty</strong> from design faculty.</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5.6</td>
<td>Participants expressed concerns that not fully integrating sustainability themes into architectural programs is a <strong>disservice to the students</strong>, and will not prepare them adequately for the demands of the profession.</td>
</tr>
<tr>
<td>5.7</td>
<td>While some faculty bodies agree to implement strategies emphasizing sustainability in their courses (such as the 2010 Imperative) participants often witness <strong>no execution or implementation</strong>.</td>
</tr>
<tr>
<td>5.8</td>
<td>Having a conversation about the integration of sustainability themes with the faculty body as a whole often <strong>creates divisions</strong> and staunch advocates for different perspectives.</td>
</tr>
<tr>
<td>5.9</td>
<td>Understanding the currency of sustainability within architecture programs, <strong>department heads and deans are voicing interest, but are not implementing</strong> or holding faculty accountable.</td>
</tr>
<tr>
<td>5.10</td>
<td><strong>Because the participants are often more involved in sustainability themes than others at their institution, they rely on camaraderie from peers at other institutions</strong> for inspiration, support and ideas.</td>
</tr>
<tr>
<td>5.11</td>
<td>Frustration occurred when participants perceived a <strong>division of architecture into factions</strong> based on seemingly contrasting elements and personal values – qualitative / quantitative, design/technology.</td>
</tr>
</tbody>
</table>

- **Context 5.1:** **Individual faculty members feel pressure** that they are the sole individuals responsible for educating on green building themes.
  
  - **Intervening Condition:**
    
    - Experience with the traditional segmented curriculum structure where each faculty member has a concentration
O Action/Interaction:

- Feeling that majority of faculty felt separated, or pigeon holed into a concentration.
- Developing a belief that the holistic integration of sustainability themes was best to implement in more than one course, spreading both the knowledge and the responsibility.

O Consequence:

- Faculty bodies come to a consensus that sustainability is a necessary issue to be dealt with consistently.
- Programs develop guiding principles and critical issues as touchstones for courses to refer back to for development and revision to include sustainability.

**Context 5.2:** Faculty believed that the issues of sustainability were more *philosophical* than a specific subject.

O Intervening Condition:

- Experience with the traditional segmented curriculum structure where each faculty member has a concentration

O Action/Interaction:

- Faculty felt that there needed to be conversations about sustainability, rather than being confined to specific courses and classrooms.
• Participants perceived students to be interested and thirsty for knowledge outside of the designated class time, for implementation in other courses and projects.

  o **Consequence:**
    
    ▪ A culture was created in a number of programs where both students and faculty could hold conversations in the context of sustainability and feel comfortable with their questions.

• **Context 5.3:** *Rapidly growing information challenges faculty to remain informed and relevant in an area where there may be a large learning curve.*

  o **Intervening Condition:**
    
    ▪ Experiential and educational background including continuing education and research in fields of chosen specialization or in the profession

  o **Action/Interaction:**
    
    ▪ Faculty recognized that there was a need for continuing education for many peer faculty members, which would consist of either bringing their knowledge of certain subjects up to a workable level, or moving their knowledge forward in a specific area
    
    ▪ Often faculty members were noted to be learning along with the students about strategies and computer programs in the courses that they were teaching.
Faculty members have the most longevity in institutions, and that institutional memory needs to be engaged in the conversation.

Concerns about appearing threatening to other faculty were readily voiced, noting that ‘trainings’ could easily become a way to alienate other faculty and do more harm than good.

- **Consequence:**
  - Some programs developed workshops for faculty members behind “closed doors” to help provide other teachers additional, helpful information. There were drastic variations in response to these workshops at different institutions: some were very successful and some were unattended.

- **Context 5.4:** *The depth and accuracy of sustainability knowledge by faculty members new to the movement was noted as a concern.*

- **Intervening Condition:**
  - Experience with the traditional segmented curriculum structure where each faculty member has a concentration
  - Growing interest in sustainability as a currency in the industry

- **Action/Interaction:**
  - Participants varied on the validity of having other faculty members simply involved and interested (engaging in green-speak), versus having them engaged in an informed and meaningful way.
• Some participants cited other faculty members at their institutions that boasted about their students’ involvement and initiative, which participants doubted had any relation to the instructor.

• Depending on the level of education - graduate or undergraduate - faculty felt their role might need to be either focused or a generalist, respectively. This would also depend on the specific student body needs.

  o **Consequence:**

  - Feelings regarding which faculty members to reach out to and how to reach out to them were varied. Approachability of other faculty was qualified in various ways including “low-hanging fruit,” “lost causes,” and “faculty on the edge.”

  - With the exception of a few participants at programs where there was consensus around the integration of these themes in courses, faculty struggled with this question of how to engage their peers meaningfully.

• **Context 5.5:** *There is a common model in architectural education that separates technology faculty from design faculty.*

  o **Intervening Condition:**

    - Experience with the traditional segmented curriculum structure where each faculty member has a concentration

  o **Action/Interaction:**
• Faculty members at the most integrated schools have faculty that teach both design studio and Environmental Controls (ECS) courses.

• Participants in programs where there was a division experienced the method of incorporation of sustainability themes into studio courses was as a guest lecture, and felt that this was not only inadequate but also shirking responsibility by the studio faculty.

• Participants at non-integrated programs shared experiences where studio faculty would tell students to forget issues from ECS “because you’re in studio now,” illustrating the divide and disinterest of some studio faculty members.

• One participant also mentioned a voting structure within their program where every faculty member gets a vote, but the studio faculty has by far the critical mass, so the technology faculty are perpetually an underserved population.

  o **Consequence:**

    ▪ Though not the case in all programs, there are still instances where there is a substantial divide between courses of content (ECS, structures, etc) and project-based studio courses.

  **Context 5.6:** Participants expressed concerns that not fully integrating sustainability themes into architectural programs is a **disservice to the students**, and will not prepare them adequately for the demands of the profession.
Intervening Condition:

- Experiencing and understanding the demands of the changing environment on the profession

Action/Interaction:

- One experienced faculty relayed instances in which studio faculty use the flexibility of the studio structure to explore their own personal needs and interests instead of focusing on providing the students necessary information for their futures.

- All participants emphasized the importance of the shift in profession, and how students need to be prepared once they move into the workplace.

- Questioning the actual goals of the education (to produce an object or a well-working building, for example) are questioned, which also calls into question issues pertaining to history and culture of the field.

Consequence:

- The emphasis on the integration of sustainability themes increases due to an immediacy felt in peer groups about the state of the environment, and how everyone is going to need to contribute to the movement.

- Alternative views and qualifiers of “good architecture” are produced and communicated to the students, with the necessary supporting arguments.
• **Context 5.7:** While some faculty bodies agree to implement strategies emphasizing sustainability in their courses (such as the 2010 Imperative) participants often witnessed *no execution or implementation*.

  o **Intervening Condition:**
    - Personal faculty interaction and the awareness of different personality and group dynamics
  
  o **Action/Interaction:**
    - The vast majority of programs represented had some hesitancy signing on to a prescriptive yet voluntary program addressing environmental goals for their program.
    - Metrics and measurable outcomes were viewed by the participants to be the trigger of uneasy feelings among other faculty, as architecture of often viewed as subjective and primarily qualitative.

  o **Consequence:**
    - There are very few programs that profess to be fully and wholly integrated. Even those that have the reputation have elements inside their programs that are resistant to quantifying their outputs (students and goals).

• **Context 5.8:** Having a conversation about the integration of sustainability themes with the faculty body as a whole often *creates divisions* and staunch advocates for different perspectives.

  o **Intervening Condition:**
• Personal faculty interaction and the awareness of different personality and group dynamics

  o **Action/Interaction:**
    
    • Participants expressed the importance of conversations and a common understanding of the issues by faculty members to align any implementation with the program’s mission.
    
    • Those subjects with experience in non-integrated programs relayed instances where tension was created when other ‘non-green’ faculty felt as though they were being attacked.

  o **Consequence:**
    
    • By creating opportunities for collaboration and individual exploration by uninvolved faculty, the conversations can become more neutral rather than an attack on teaching methods and personal philosophies.

- **Context 5.9:** *Understanding the currency of sustainability within architecture programs, department heads and deans are voicing interest, but are not implementing or holding faculty accountable.*

  o **Intervening Condition:**
    
    • Personal faculty interaction and the awareness of different personality and group dynamics
    
    • Exposure to the politics of different groups at various scales, such as the department, program, college, university, and larger field

  o **Action/Interaction:**
Participants and potentially other faculty voice the importance of an inclusive view on sustainability at faculty meetings.

Proposals for integration are put forth, but no follow-up strategies are put in place (committees, reporting, etc).

- Consequence:
  - External assessment methods, guidelines and internal rubrics are developed (ie: Carbon Neutral Design Studio) for implementation.

- **Context 5.10:** Because the participants are often more involved in sustainability themes than others at their institution, they rely on camaraderie from peers at other institutions for inspiration, support and ideas.

  - Intervening Condition:
    - Personal interactions within their program and the feeling of separation within their own faculty

  - Action/Interaction:
    - Participants expressed feeling the need to identify with like-minded faculty both within and outside their institution.
    - Feelings of disengagement, complemented with feelings of demand and intensified by the standard pressures on faculty, create an intense working environment for sustainability champions within their own programs.

  - Consequence:
    - Outside networks such as SBSE are created.
• **Context 5.11:** Frustration occurred when participants perceived a division of architecture into factions based on seemingly contrasting elements and personal values – qualitative / quantitative, design /technology.

  o **Intervening Condition:**
    - Awareness of history in the design field, as well as exposure to individual beliefs of various faculty members
  
  o **Action/Interaction:**
    - Teaching loads and concentrations are often divided between studio and environmental control systems (ECS).
    - Throughout their careers participants have interacted with designers that place primary emphasis on qualities of space, aesthetics, and sculpture, claiming that all other aspects of architecture are subservient to the creation of physical design.
    - ‘High design’ is seen as a religion and goal to which to aspire.
    - Faculty divisions reinforce the cultural constructs of Solitary Icon, Enlightened Designer, etc.
    - The creation of form strictly for aesthetics and to make statements has been a central driver of the educational system, in contrast to form created for building performance and user appreciation.
  
  o **Consequence:**
    - While advocating for a unified approach to design, many faculty members actually lend credence to the internal division (ECS teachers
and designers) by acknowledging the divide, though they are fighting against it.

5.2.6. PHENOMENA 6: Integrated Curriculum

Table 15: Phenomena 6

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- **Context 6.1:** Participants agreed unanimously on the importance of studio to the architectural education process.
Intervening Condition:

- Personal exposure to the studio culture and process, as both student and faculty, as well as hearing other accounts of studio projects from other programs and faculty

Action/Interaction:

- Students are drawn to interact with studio faculty.
- Faculty members acknowledge that the energy in a program stems from studio works and culture.

Consequence:

- All faculty members at all levels understand the importance of studio, and therefore have a need to engage the studio projects and studio faculty in the sustainable design movement to achieve maximum impact.

Context 6.2: Most faculty view studio to be a separate entity within the curriculum structure.

Intervening Condition:

- Standard curriculum structure overlaid with traditional faculty personalities and tradition

Action/Interaction:

- Faculty members feel the increasing importance of integration and interdisciplinary design within the profession.
Building systems thinking is not seen as incorporated into studio projects and relegated to ECS courses.

Studio is perceived to be the creative nexus of the architectural education process.

Participants are not seeing themes from other courses, such as ECS, reflected in final studio projects.

- **Consequence:**
  
  Participants believe that for sustainability themes to be seen by both faculty and students as an overarching paradigm and touchstone for the program, studio and supplemental seminars need to be feathered together for cross-referencing and reinforcement.

- **Context 6.3:** *A combination of history, design, tradition, hour allocation, and credit allocation establishes the understanding that studio is the most important item in the architectural education process.*

  - **Intervening Condition:**
    
    Hierarchy of courses in curriculum, positions of other faculty, tradition

  - **Action/Interaction:**

    - Studio holds the majority of both time and credit allocation.
    
    - Work time outside of class is often concentrated on studio work.
    
    - Studio performance and grades have an impact on students’ individual identities and self-reflection.
Consequence:

- Given the established emphasis on studio from both the faculty and students, participants attempt to integrate green building themes into studio whenever possible.

**Context 6.4:** There are various approaches to teaching within the studio setting.

Intervening Condition:

- Traditional studio structure of studio; traditional faculty approaches to instruction

Action/Interaction:

- Participants believe that the studio format is good, providing intensive time and thinking space for creative development and strategy integration.
- Studio projects are often focused on object making.
- In line with the highlighting of object development, there is a comparison of emphasizing the final product versus the design process.

Consequence:

- Participants believe that the traditional studio approach is no longer applicable or appropriate, especially after the first few years of course work. Instead, participants would like to focus on both breadth and depth interchangeably within the studio setting, or focus on specific
strategies for students to gain a better understanding for future reference.

• **Context 6.5:** The assessment of studio is rarely outlined and traditionally highly dependent on the **subjective assessment** of the faculty members.

  o **Intervening Condition:**
    - Tradition, history, faculty culture, studio structure

  o **Action/Interaction:**
    - As the context of the profession changes, there are new layers of measurable impacts increasingly seen in studio projects.
    - Flows into and out of the building (water, energy, daylight) are increasingly included in studio by study participants, and ought to be included in the presented framework for studio assessment for all studios.
    - Environmental criteria in not uniformly or strategically being addressed in studio projects.
    - Studio grades are able to be padded, allowable by the fact that the reviewed criteria are primarily subjective.

  o **Consequence:**
    - Participants believe that an understanding of goals and measurable outcomes from studio courses would help to integrate themes within the sustainability movement, which would need to include metrics as a portion of the assessment.
• **Context 6.6: Interdisciplinary themes are rarely seen in a studio setting** where they could have the greatest impact.

  o **Intervening Condition:**
    - Tradition, faculty work load, studio schedule, academic silos

  o **Action/Interaction:**
    - Common first year courses are popular in interdisciplinary colleges to provide a foundation for all disciplines, building on a similar base for future works.
    - Collaborations are increasing both within colleges and between different disciplines.
    - The skill levels and understanding of systems by students are perceived to benefit from exposure to other disciplines.
    - Outside experts are enlisted to come into studio to contribute bite-sized pieces of information for students to include in studio projects.

  o **Consequence:**
    - Some participants are actively looking for ways to incorporate interdisciplinary projects into the studio setting, and some have been successful. Others believe it would be extremely beneficial but believe the coordination to be too much work between different disciplines.
• **Context 6.7: Project-based learning**

  o **Intervening Condition:**
    - Exposure to traditional educational methods in architectural education, both as student and faculty; involvement with real-world project based learning initiatives

  o **Action/Interaction:**
    - Faculty look toward industry to better understand what skills and considerations students need to upon graduation.
    - Design/build projects are explored or possibly implemented to increase student exposure to real world problems and process.
    - Real clients and real sites are engaged when possible to give students a better understanding of practical considerations.
    - Case studies are used as projects to understand and analyze existing buildings, enabling students to recognize mistakes of the past.

  o **Consequence:**
    - Faculty are looking for projects that can both engage students with real world issues, such as site and client, as well as emulate a realistic design process involving other disciplines.

• **Context 6.8: Inadequate integration across courses**

  o **Intervening Condition:**
    - Engagement in architectural education at both student and faculty levels
Action/Interaction:

- Faculty members witness the segmentation of topics across the curriculum instead of feathering knowledge between courses for uniform and emphasized implementation.
- Courses that could have sustainability as a component often have the issue omitted from discussion topics.

Consequence:

- Faculty believe that sustainability themes should be brought to light in every course, or at least at every level, for full integration to become more achievable.

Context 6.9: Create a solid sustainability foundation early in the education

Intervening Condition:

- Exposure to and involvement with the traditional educational process both as a student and an educator

Action/Interaction:

- There is rarely an introduction to sustainability themes early enough in the curriculum for the issues to be perceived as and included as foundational knowledge.
- Understanding sustainability themes has to be intuitive to students before they are able to integrate and analyze strategies.
- Foundation courses focusing on sustainability within the larger university are seen to be of value for architecture students, notably in the early years.

  o **Consequence:**
    - Study participants advocate for exposure to sustainability themes as early as possible, understanding that basic knowledge must be developed first and then built upon.

- **Context 6.10: Current assessment methods** outline critical elements to be included in architectural education.

  o **Intervening Condition:**
    - Experience as a faculty member and with accreditation reviews

  o **Action/Interaction:**
    - Accreditation standard frequently go through a revision process and ask for input from faculty and programs.
    - Some programs are implementing self-imposed metrics to help mediate and moderate the assessment of sustainability themes in their programs.
    - Some groups are advocating for clearer learning objectives to assist in the assessment process, both internally and externally.
    - Overall goals of programs and architectural education are established but rarely revised.
Consequence:

- There is a feeling of disappointment surrounding the inclusion of sustainability themes into newer version of accreditation standards.

5.3. Selective Coding: A Holistic Understanding

The third and final coding phase, selective coding, allows emergent categories developed during the first two phases of open and axial coding to be examined, resulting in a core category that explains the relationships between these sub-categories. Developed in narrative form, this process investigates the complexities of internal relationships between the categories and concepts generated in the previous rounds of data analysis. Explained by Strauss and Corbin (1998) as a final process to outline the “variation as well as the main point made by the data,” this narrative reveals a core category that establishes an overarching viewpoint from which to comprehensively view the data. This unified perspective allows the results to be further refined and focused. In this process, the data is re-examined to look more closely at larger philosophies and common perspectives among participants.

During the selective coding process, the developed narrative is continually reviewed for logic and internal consistency. This method includes revisiting all properties and dimensions outlined during axial coding through the lens of the proposed core category and theory narrative. These linkages address all outliers and variability within category dimensions, establishing logical connections between the dimensions and the developing explanatory narrative (Strauss and Corbin 1998). The developed narrative should be convincing without being artificially precise, which would indicate forced data. The final result is a consistent and articulate argument recognizing all variability and outliers within
the data. This reasoning and connectivity establishes credibility, as outlined by Eisner, who posits that creating clear theoretical connections with strong coherence is important to grounded theory studies (Eisner 1991).

For the faculty interviewed in this study, the **students are the focal point** of their classroom efforts and are the **touchstone** for all other elements impacting the participants’ worldviews regarding education. **Engaging and positioning students** appropriately to contribute to the profession are the most important factors to participants, reaching beyond the classroom and into communities and projects. Contexts of **cross-campus involvement, culture and tradition, framework development, student activities, faculty involvement, and integrated curriculum** are all discussed as ways of **empowering, involving and engaging students** in the realm of sustainability (Figure 6).

Figure 6: Consistency among emergent themes
The **culture and history** of the field remains an important aspect of architectural education. Participants are each actively struggling with the **culture and tradition** that have developed through the years in the field of education. While the role of **studio as the primary venue** for architectural education is understood and supported, the **cultural constructs** surrounding the field and the studio are seen as a significant barrier. In some instances these cultural considerations take the form of a “high design” mentality, where the physical design of the building **emphasizing form giving** is seen as **separate from performance** and user issues. Some participants **question the use of traditional studio projects**, feeling that the approach and scale are **no longer applicable**; these whole building studio projects are typically a medium-sized, single building, which covers neither issues of breadth (out into the community and natural systems) or depth (into the detailed systems and strategies within the building). The **appropriateness of projects and structure** is consistently being called into question by faculty.

Participants are also questioning the **educational goals and process of their faculty**. Specifically, differences are addressed between **professing and educating**. In the participant group, ‘professing’ or ‘teaching’ is described as an act similar to training, or imparting knowledge; passing on ideas and methods with supporting information but without critical questioning and reflection. Educating, on the other hand, looks at the critical questions of **how and why**, among others. The first method of training maintains the strong **tradition of master and apprentice**. Though no longer a commonly acknowledged method, it is thought to still echo through the halls of some programs. Faculty members propagating this method are teaching **what** and **how** they were taught; they pass on knowledge, perspectives and
approaches that they were taught while they were in school, and are now teaching other
generations with similar methods. In effect, through this tradition, some faculty members are
creating disciples of their philosophies. Though continuity is important for any discipline,
this stability enables historically popular and established philosophies to continue to exist
and remain strong, whether appropriate or not.

Participants feel that this perpetuation contributes to established factions within both
individual programs and within the education realm overall: designers and non-designers.
Designers and design faculty are often revered as a singular creative genius whose ideals
embody culture, sophistication and knowledge; students can witness these attributes through
any number of characteristics including clothing, rhetoric, and attitude. When exposed to
these characteristics, students may try to emulate the perceived glamour and buy into the
philosophy. While participants believe that fewer and fewer students are buying into
modern, slick, glossy magazine design that has been the goal of the design culture for
decades, there are still strongholds subscribing to this philosophy in formal education.

The admiration of the individual designer supports a designer/engineer division,
or the designer/non-designer divide, as witnessed in both the profession and the academy.
This division is also propagated within architectural programs, enhanced by the seclusion of
students within the programs. Due to the rigor and culture of programs, architecture students
are often perceptually separated from the rest of campus, which helps the school to
establish and maintain a narrow focus on design culture, strengthening established
philosophies.
Technically-oriented faculty members teaching structures or environmental controls feel stigmatized and feel they are perceived as in-house engineers; in traditional design perspectives, this position is not typically flattering or desired. This division is the embodiment of the Arts and Sciences divide, but within the context of one program. However, participants agree that a multi-faceted approach to the design process is necessary for the integration of sustainable design. Bridging gaps between different but complementary fields adds layers of complexity to the design process that need to be incorporated into both methods and lessons taught in architecture programs. Many faculty members meet this additional complexity with hesitancy as it may be seen as compromising the status quo and established process. Faculty members not involved in sustainability may see the complexity inherent in sustainability as a possible perceived barrier to embracing sustainability themes.
To begin to understand and incorporate this added complexity, participants create different levels of frameworks to help provide necessary context to students. These frameworks are structured at different levels, from overarching paradigms and philosophical stances to strategy matrices applicable for understanding design implements and their associated impacts. Participants believe that various levels of context are absent within current educational methods (Figure 7), omitting necessary and important topics ranging from environmental impacts to understanding flows into and out of proposed
designs. Understanding sustainability at a philosophical level enables students to frame decisions as they move forward in all stages of the design and construction process. Situating a project within an environmental context provides connections, references and linkages that are not obvious when the project is viewed as an object placed within a landscape.

When the building is approached as a singular object, there is little or no connection to other systems; these systems, however, should be a part of the design and building process. Often building system analysis is left out of design exercises, as traditional studio exercises focus primarily on the design of form. Viewing the building as a singular and distinct object also allows the design to be static, as opposed to the reality of a design being a dynamic entity impacting and being impacted by outside forces. Building as Object negates any connection to larger systems beyond the building. Understanding that the design is a part of something larger than just itself, with connections to other environmental elements, is not traditionally or readily recognized.

Reflecting on the emphasis of the designed objects, as well as the tradition of the singular creative genius, the creative design process is traditionally viewed as indefinable and irreproachable. Instead, guidelines and frameworks can be imposed and referenced to help guide the design and its process, as well as providing context and additional knowledge to the final product. Similar to discussions of design theory, there are established style guidelines and philosophies in place for addressing various design theories, referenced by design faculty. The implementation of sustainability frameworks is, however, viewed by design faculty as too stringent and too cumbersome to allow for true creativity. Proposing a
framework and principles for reference during the design process is seen to be both reasonable and beneficial by participants.

The modification of the standard creative design process is important to many of the study participants, specifically relating to the strategic inclusion of sustainability elements. However, some do not particularly address the creativity process in their courses; instead they look at strategies and questions that are not typically contained within the studio.

Through these strategic alterations and additions to the design process, the creative process is itself altered. In response to this change, the standard linear design process is questioned (Figure 8). Though the creative process is cyclical, with the design being modified after feedback or critiques, as one participant pointed out, the overall project process remains

Figure 8: Traditional linear design process

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Through these strategic alterations and additions to the design process, the creative process is itself altered. In response to this change, the standard linear design process is questioned (Figure 8). Though the creative process is cyclical, with the design being modified after feedback or critiques, as one participant pointed out, the overall project process remains
linear: programming to design to engineering to contractor. Systems issues are traditionally not incorporated until the design is finished, and typically by engineers outside of the architectural profession (Figure 9).

Frequently involving the students with and providing access to different aspects of the design and construction process is seen to be highly beneficial. Some participants specifically mention the involvement of students in different outreach activities such as: attending national conferences or organizing their own campus events; participating in on-campus sustainability groups; and assisting in research. Support of these initiatives appears indirectly through the narratives of others. These initiatives can also include student
groups and campus-wide initiatives. By getting involved in sustainability efforts outside of the confines of studio, the students **indirectly express their interest**, which faculty should notice and take into account in course and curriculum development, possibly using the involvement as support to **increase sustainability offerings** in the program. Through an understanding the specific personalities and interests of their student bodies, **faculty can tap into and capitalize on** issues that energize students.

Building on the importance of student activities and involvement, many of the interviewed faculty members actively look for ways to **engage students at other levels** in courses, beyond the traditional theory-based design projects and associated site visits. These opportunities involve **design-build programs, integrated design studios, repeated site visits, conference presentations, research, data gathering, building assessment and testing, and various scales of manufacturing**. Intensive programs such as design-build projects allow for student engagement in a number of levels not addressed extensively in studio: client relations, interdisciplinary efforts, fieldwork and construction administration, budgeting and marketing. Extensive **travel** is also beneficial; particularly travel beyond local site visits allows students to better understand different climate demands, building methods and cultural contexts.

The **involvement of the faculty** body is seen as an indicator as to how well the individual programs are addressing sustainability. In programs that are perceived to have integrated these themes most successfully, the faculty approach **sustainability as a philosophy** rather than a separate subject on a checklist to be addressed. In programs where there are only one or two faculty members encouraging integration, those members
frequently feel **frustrated, stigmatized and separated**. At times there may be pressure to be the ‘go-to’ resource for all sustainability information, which is difficult with the breadth and depth of the topic. This situation not only pressures the faculty members acting as champions, but also should challenge “other” faculty to engage in **continuing education** to remain current on these issues. The “other” faculty members do not often recognize this need for additional education because they may not be interested in sustainability, and not see their lack of knowledge as an issue. Often the individuals in the champion role seek out **those in similar positions** at other programs for support, resources and company. These peer groups are valued by most of the participants for sharing and camaraderie, but can also be seen by some as preaching to the choir.

There are differing opinions regarding “other” faculty that are beginning to express interest in sustainability. Some participants feel that **any interest is good interest**, and the more people on the bandwagon and moving toward a unified sustainability goal, the better. Others are **concerned with the validity** of how newcomers are including and understanding green building implements, and what methods and foundations they are using to instruct and engage students. This concern relates directly to **what is being taught** and the issue of **depth and accuracy** of newly acquired knowledge. **Greenwashing** is seen as a problem by some participants, where faculty claim to be on board and interested in sustainability, but are **not implementing sufficiently**, if at all. For example, there may be a problem with faculty teaching “green design” or “sustainability” **without a definable connection** to methods. This inconsistency and inaccuracy suggests the need for **assessment methods and suggested integration measures**. Department and college leadership also concern participants,
specifically when deans and chairs voice interest in sustainability but **do not hold faculty accountable** in implementation or assessment.

Architecture is a field of **ambiguous terms and subjectivity**, and the realm of sustainability follows suit. Participants do not readily use terms such as *sustainability, green architecture, carbon neutral, and regenerative design*, among others. Instead, the **principles of these themes are taught** – not the terms themselves.

These faculty issues have a direct relationship to the **actual implementation** and integration of sustainability themes in architectural curriculum. **Studio is the most important venue** for sustainability themes to be incorporated (Figure 10), but the perceived divide between ‘champion’ faculty members and traditionally **uninterested design studio faculty** is an enormous obstacle. When a studio being taught by traditional design faculty does address green building themes, these issues may still be **viewed as additive and separate**; sustainability experts or faculty members are often brought in to give a “sustainability spiel” instead of approaching the themes as **integral to the design process**. The architecture programs in which multiple **building science faculty also teach studio** are often seen as being very strong in integration.
Support courses, or other courses in the curriculum intended to complement studio through the introduction of other topics in lecture and seminar format, are not the focal point of integration but are also important. Each and every course taught in architecture can have sustainability feathered into its content, regardless of the specific topic being taught. While studio provides the most return on investment for sustainability themes, the support courses are equally as important in establishing the foundational knowledge to be used in the studio projects.
Project-based learning courses are perceived as by far the most effective way of educating students about sustainability themes. These projects often involve interdisciplinary teams, with additional team members from both inside and outside the college. The combination of real-world projects and the integration of other disciplines is regarded as the most effective way to educate about green building themes. There are few examples of interdisciplinary teamwork where other disciplines contribute to course projects, as opposed to strictly passing on information. However, while this is viewed as important, it is perceived to be extremely difficult to coordinate and organize between majors.

Assessment criteria for both faculty and student work are needed at all levels. There are rarely internal assessment methods established by the different individual programs to evaluate (1) if/how there are sustainable themes included, and (2) with what result. Those programs and faculty that are attempting to integrate sustainability are often making it up as they go along, without definitions or measuring sticks available to help gauge their efforts and efficacy. These are concerns with NAAB’s accreditation reviews, which are seen to be insufficient regarding sustainability criteria.

The number of issues needed to successfully address sustainability contributes to a need for legislation and policy to be more frequently referenced in studio and support courses. This exposure would impact how projects are seen in context of codes, laws and initiatives, as well as how the specific project fits into both physical and cultural context.
5.4. Emergent Core Categories

The examination of the relationships between categories and subcategories directed the recognition of two primary themes. Though Grounded Theory traditionally looks to establish one core category, this exploration reveals two consistent themes as core categories for this exploration, at two different levels: Student Engagement as a teaching method used by participants; and Repositioning the Worldview in relation to the culture, tradition, approach and community developed in the field.

For this purpose, the term Student Engagement is being used to refer to additional activities and initiatives beyond the boundaries of the university. For example, the vision of North Carolina State University regarding Extension, Engagement and Economic Development, similar to many other outreach institutions around the country, is “To model excellence as the nation's university leader in partnering with communities and organizations that seek educational advancement, research applications and positive social change.” Through this lens, engaging architecture students explicitly means to integrate and expose the students to community and real-world projects outside of the classroom and studio setting. Additional student exposure and interaction is seen through consistent references such as travel requirements and opportunities, case study projects, research opportunities and community engagement efforts, all included as elements of coursework. This emergent core theme is seen steadily throughout data reflecting the sphere of influence at the individual faculty level.

In partnership with individual instructor methods for incorporating sustainability themes into the curriculum is the larger issue of Repositioning the Worldview of
architectural education. In other words, participants perceive that it is necessary to craft a curricular response to the environmental demand for a new worldview in architecture. Recurring themes within the data relate to issues including a division of faculty, modified approaches to traditional subjects, changing demands of the profession, and the place of studio in the educational process. These two core categories establish consistent lenses to overlay on the data, mediating a final assessment of the relationships between the categories and subcategories that were established during the data analysis.
CHAPTER 6: Discussion, Implications and Conclusion

Using qualitative research methods in this study allows for the discovery of common threads within architectural teaching methods emphasizing green design and sustainability. Through the exploratory process, the core categories of Student Engagement and Repositioning the Worldview surface from the relationships among categories, seen as phenomena, as consistent themes in the gathered data. These phenomena, or “subcategories” of the established “core categories,” include Cross-Campus Integration, Culture and Tradition, Framework Development, Student Activities, Faculty Involvement, and Integrated Curriculum. The findings from Chapter 5 are summarized and evaluated here in Chapter 6. The identified core categories, Student Engagement and Repositioning the Worldview, provide lenses for the summation of themes that are developed through the exploration of the subcategories.

In a section entitled Overview of Theory Creation, this chapter first reviews the theory creation process, starting with the examination of the data through an inductive progression. This initial examination in theory creation is followed by a review of the associations between the emerging relationships within themes and patterns, finally resulting in a cohesive theory that incorporates all aspects of the found relationships. This theory creation process is illustrated in Figure 11.
6.1. Overview of Theory Creation

As outlined previously, the ultimate goal of a grounded theory study is to generate a theory addressing a specific topic of interest typically left as a gap by previous research. Relationships are explored among various emergent categories that appear during the coding process. The initial round of coding focuses on understanding and illuminating different concepts within the data, based on what the participants said both directly and indirectly. Categories of these preliminary concepts form as the interviews are completed and coded, and properties and dimensions are established for data within each category. The second round of coding, axial coding, pulls the explanatory bits of data into the appropriate categories, creating and examining relationships between categories and data. This round of coding looks at how the relationships occur between the contexts of actions and circumstances (Strauss and Corbin 1998). The last round of coding, selective coding, scrutinizes the categories and data found during initial and axial coding, solidifying the data.
and relationships around central themes, called the core categories. These core categories establish logical connections among the data and relationships, incorporating any variation found within the participants’ perspectives and data gathered.

This staged and streamlined coding and analysis leads to the development of **Student Engagement** and **Repositioning the Worldview** as two core categories. Student Engagement mediates the other emergent categories by informing an understanding of how faculty members involve students with green building themes during their educational experiences. Successful programs have notable instances of student involvement in areas such as:

- Taking on leadership roles in organizations
- Participating in cross-campus initiatives
- Contributing to research
- Project-based learning

Therefore, successful faculty members integrate green building themes into architectural education by encouraging increased levels of active engagement of students, specifically outside the traditional classroom.

The **Repositioning the Worldview** core category mediates other emergent categories by identifying areas for possible action regarding curricular and philosophical development. While many participants do not reside in programs embodying this type of holistic shift, their perceptions regarding such a transition are consistent. Participants believe that an architecture program would excel at sustainability integration by including elements such as:

- A level of respect and acceptance of sustainability themes by the faculty
- Increased communication about environmental issues
- Established standards by which to assess sustainability efforts
- Increased engagement with other disciplines

In this context, participants believe that programs have a better chance of becoming successful by critically assessing the position of their programs in light of these larger issues.

6.2. Exploration of Research Questions

To guide inquiry and allow for emergent themes, the initial primary research question, or central question, is framed in a broad manner. As data collection and analysis advances in grounded theory studies, the initial central question has the ability to narrow or shift in scope to fully represent the emerging themes within the data. Throughout the interview process, all participants discuss and perceive their efforts of sustainability integration - be it course development, data collection, or interdisciplinary work – in terms of how students are critically engaged in sustainability and green building themes. Similarly, each participant discusses overarching shifts in perspective that they feel are valuable to a program interested in environmental integration. As a result, Student Engagement and Reinterpreting the Discipline emerged as the defining focus for the integration of sustainability and green building themes in architectural education. Focusing primarily on the instruction methods used by the individual participants, a modified central question explicitly addressing student engagement becomes:

Central Question 1: How is student engagement being facilitated to successfully incorporate sustainability and green building into formal architectural curriculum?
Speaking to the larger philosophical framework and approach to curriculum, a second central question becomes:

*Central Question 2: How can the architecture discipline be reinterpreted to successfully incorporate sustainability and green building into formal architectural curriculum?*

The first question addresses method while the second addresses philosophy. Both are equally important. Through these two layers of pointed and focused inquiry, an identifiable concentration emerges that guides the final coding and categorization of the data. It also establishes a perspective from which to narrate and illustrate the relationships between categories and data. There are found to be six areas of impact for the integration of sustainability themes: *Cross-Campus Integration, Culture and Tradition, Framework Development, Student Activities, Faculty Involvement,* and *Integrated Curriculum.*

In the following section, the research questions and sub questions are evaluated in light of the data analysis process and the findings, through both lenses of method and philosophy as outlined above. The six subquestions are grounded in both experience and literature about various factors contributing to architectural education. Because these subquestions were formulated to explore specific elements of integration regarding sustainability and green building themes within architectural education, the subquestions are each stated and addressed fully regarding both method and philosophy before exploring the overarching central questions. When the six subquestions have been reviewed, the central questions are explored in the context of the findings and existing literature.
6.2.1. SQ1: Course Structure

SQ1: How are courses structured that are seen as successful? What elements are necessary for a successful course? What type of instruction is most conducive to sustainability integration?

Participants believe that courses capitalizing on student involvement and engagement, particularly outside the boundaries of the university, are the most successful venues for the integration of green building and sustainability themes. As seen in the growing body of literature on student engagement (Leithwood and Jantzi 2000; Hayek and Kuh 2002; Zhao and Kuh 2004; Kuh 2005; Umbach and Wawrzynski 2005; Carini, Kuh et al. 2006), increased student participation is important to, and valid in, many educational areas. However, for a historically inclusive and separatist field such as architecture, the additional impact of outreach beyond the classroom and university is considerable. The identified courses include a variety of structures and types, with studio courses receiving the most emphasis in discussions.

Studio courses entertain the most attention because this venue is the staple of the architectural curriculum, responsible for the most in-class time, out-of-class work time, and credit hours. Studio courses provide the academic and creative space where students are exposed to and engaged with various methods of integration, implementation and application across the breadth of design concerns. Ideally, the knowledge that is established in other lecture and seminar courses is assimilated into a coherent design process within the studio setting. The extensive amount of time spent in the studio is also a consideration, with typical studios holding class time three days a week for four hours each day. In agreement with the
historical importance of studio instruction in architectural education, participant narratives reiterate the significance, applicability and effectiveness of this teaching space.

Beyond the acknowledged prominence of studio, no other favored course structures are frequently mentioned with regard to sustainability themes. While many of the participants are involved with building science and environmental control (ECS) lecture courses, participants feel that ECS courses are popularly seen as the go-to, token courses for sustainability in the eyes of the faculty. As one participant states, “If sustainability isn’t being addressed in environmental control courses, there is something wrong.” Though participants agree that sustainability should be addressed in ECS courses, they also feel that this is not the only place that these themes should be integrated. Ninety percent (90%) of study participants are or have been involved with environmental control courses at their home programs. In addition, all mention that typically the faculty members most interested in sustainability within architectural education are those most interested in building science.

In parallel to the discussion surrounding the compartmentalizing of sustainability themes within ECS courses, participants perceive that most faculty members interested and actively involved with the sustainability movement do not serve as studio faculty in their programs. In this study, despite 80% of the participants regularly teaching studio courses, they view their sustainability interests to be in the minority of studio instructors. Participants strongly feel that there is a perceived divide between studio and non-studio faculty, or – in schools where all faculty teach studio – design and non-design faculty. Faculty members interviewed believe design instructors share this view of a segmented faculty, distinguishing between “us” (designers) and “them” (others). This perception of faculty division is
supported by the negative case interview incorporated into the data, which regularly insinuates the existence of distinct “sides” or conflicting philosophies within architecture programs.

The following positions are perceived as givens: (1) studio is the most promising venue for the integration of sustainability themes due to the extensive student engagement and time commitment, and, (2) that sustainability themes are, or ought to be, inherent in environmental controls courses. Beyond these two views, participants do not favor certain courses for the integration of sustainability themes over others. In fact, it is commonly perceived that any course can be manipulated or shifted to include sustainability and environmental themes. Some specific courses cited are professional practice, history and philosophy courses. As noted by one participant, “I think sustainability can be brought to light in every course. A green lens should be put to every syllabus and see where [these themes] can come through in.”

Historically studio courses have been perceived and taught as though they were completely separate from other courses. Though studio is often seen as the core of the curriculum, it is rarely integrated fully with reference to support courses. While participants agree that the most important infiltration of sustainability themes was into the studio, they also believe that these themes need to be feathered into support courses as well. Another course structure noted as highly successful but fairly rare is the pairing of studio and lecture, taught by the same or partnered faculty, where both courses reinforce each other throughout the semester. This structure is perceived to extend the engagement factor of studio into other courses. Re-visioning studio as an integrated part of the curriculum allows for better
integration among existing courses, enabling an easier incorporation of sustainability threads by eliminating course divisions within the curriculum.

Course size is not thought to be an issue for the integration of sustainability themes. Specific courses dedicated to sustainability, such as a green building seminar, are not felt by participants to be an indicator of the program alignment or integration either way. For example, the fact that a program has a course dedicated to green building methods does not mean that these themes are not integrated elsewhere; nor does the fact that a program omits sustainability from their course descriptions mean that they are not teaching the principles. These perspectives support the notion that the implementation methods, means, scope and venues are without standards and are highly variable.

Recounting experiences with successful studio courses, participants that teach studio courses often include conceptual frameworks in their instruction to create context for students. In other words, these faculty members create an ordering mechanism to help engage and situate students by identifying and prioritizing various concerns and strategies. The development of these constructs holds multiple purposes; first, to provide a framework of context for students to work within; second, to help students manage the complexity of sustainability issues; and third, to establish a process that students can reference as they progress through their education and into practice. Some of these frameworks are abstract and categorical, created by the faculty themselves. Others are implements or tools that faculty feel address either multiple issues or a root sustainability issue.

Many of these frameworks are geared at instilling foundational knowledge in the students; they are also predominantly process-oriented. Understanding that there are real-
world considerations that need to be incorporated into designs, in partnership with formal design elements, guide the faculty in how they formulate educational methods and engagement plans for their courses. There is perceived to be a dichotomy between the traditional product-oriented studio courses and the development of a design process. The former have traditionally resulted in problem-solving techniques related to adjacencies, site constrictions and constructability, while the latter critically reflects on the decision making process.

6.2.2. SQ2: Interdisciplinary Design

SQ2: What role does integrated design play in the implementation of sustainability in architectural education? How integrated do we have to be?

Many participants feel that while interdisciplinary work is integral to sustainable design in professional practice, the inclusion of multiple disciplines within architectural education is not mandatory. However, this issue is an area of conflict for many participants. Every participant agrees that interdisciplinary design is absolutely imperative to sustainable design in the profession, but most feel that the established structure and rigor of the architectural curriculum makes it extremely difficult to bring in active participation from other fields. Ideally, participants would like to see any number of complementary disciplines brought into the studio including, but not limited to, engineering, construction management, environmental studies, ecology and agriculture. Many participants, despite being housed in a college of similar disciplines such as landscape and interior design, feel that even integration with in-college disciplines is difficult to manage and are hesitant to look to fields outside of design.
The thought of bringing in other disciplines from elsewhere in the university, such as engineering, seems futile. One of the common concerns is the notion that interdisciplinary work needs to be withheld until later in the educational timeline, and introduced either in graduate programs or in later years in a professional program. Participants not only feel that it is difficult to logistically manage the participation of other groups within a studio setting and the design culture, but also that their faculty does not welcome opening their doors to other units on campus. Participants are often overwhelmed with educational challenges and responsibilities without including the coordination of interdisciplinary work in their scope of concern; this level of integration is commonly perceived as requiring too much effort in light of what each individual could affect. Therefore, it is often passed off for other initiatives and contributions.

However, four participants (40%) have incorporated interdisciplinary themes extensively and successfully. One case involves multiple disciplines within the program’s home college, including landscape design and interior design. Another participant includes construction management, which is also within that program’s home college, as well as structural engineering and landscape design, which are housed in other colleges on campus. The faculty members that have been successfully involved with interdisciplinary design initiatives believe that the final projects and results of the courses are exceptional, and that the students benefit extensively from the engaging experiences.

Despite the rare exposure to full interdisciplinary contributions, many of the participants make significant efforts to engage their students with the process and insights of interdisciplinary endeavors. One participant systematically brings in experts to the studio for
presentations, allowing the students time to digest and appreciate the information before bringing the expert back for a review. Another method of engagement is having students role play through a scenario of different project team responsibilities, allowing each to get a feel for different perspectives, criteria, concerns, etc. Interdisciplinary charrettes are also cited by a participant to support interdisciplinary design themes, exposing students to different considerations in the design process, but limiting the course schedule disturbance and coordination needed.

An emergent theme regarding the division of the discipline of architecture itself, where design faculty and non-design faculty often act as though they are in fact in separate disciplines bringing a new perspective to the term ‘interdisciplinary.” This perception speaks to larger issues of accountability and perceived worth of concentrations and interest areas, both of which could be dependent on the focus or reputation of the school. In programs perceived to be a “design” program, non-design faculty members feel that they retain a lesser status than design faculty. There is a belief that non-design faculty members are not as equally represented in goal setting sessions and school initiatives as design faculty.

6.2.3. SQ3: Contested Perspectives

SQ3: How are contested perspectives regarding sustainability addressed within the classroom? How are they addressed within the larger curriculum?

The notion of sustainability, and all the elements combined within it, can be a highly contested issue in numerous settings. However, because many sustainability courses are electives and employ self-selection, participants do not experience many cases of student contestation within the classroom. When specifically asked, there are few methods or
examples that participants relay regarding classroom conflicts. One participant noted that his preferred method is to not acknowledge conflict as it arises within the classroom, preferring the students to discuss it and work it out among themselves. “I let the students take care of it. It’s like the ostracized smoker,” he says.

Some assignments are designed to ferret out differing perspectives within the class, preempting potential conflict with class discussions. This method not only brings out many prospective disagreements for discussion, but also allows students to voice their questions and concerns in a safe setting and structure. Faculty members that included other disciplines within courses cited minimal conflict as a result of differing discipline perspectives, concerns and approaches. While potentially conflicting approaches to design and building are seen in these instances, they are framed as real-world situations and can inform future experience.

During the interviews and data collection process for this study, there was a thread posted to a building science and architecture educators’ listserve addressing a conflict in a class. Because many of the study participants participate on this specific listserve and their like-minded peers contribute regularly to the thread, the posting is incorporated in this study as an alternate data source. The initial posting was sent by an Associate Professor faculty member (who is not a study participant), paraphrasing a student from one of their courses. The paraphrase as included in the original email is as follows:

(Student) “I guess I am just wondering what your agenda really is. All that you have been regurgitating is the notion that Al Gore is correct, the Kyoto Protocol means something other than keeping Africa and other underdeveloped nations

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6 Mon, Sep 28, 2009 at 10:55 AM
from using their plentiful natural resources of coal and oil to become industrialized in effect dehumanizing their existence, CO2 is bad, every time a glacier melts a new one is not formed and that human civilizations are the only variable involved in temperatures changing.

It seems to me you are not acknowledging everything available and only present and acknowledge the things that support your and your peers view of weather, climate and projections of these things that we have no way to predict. Weather reporters even have a hard time telling what the weather is going to be tomorrow to the end of a week let alone the impossible task of guessing the weather 5 weeks from now. If you choose to acknowledge one view on a subject how partial are you really, are you really a professor of all, are you really an architect mindful of variability not absolute?

Unless there is a 100% agreement and overwhelming indisputable evidence to support action on an issue as Designers, as Critical Thinkers, as Analyzers and especially the way that we think as Architects and students of Architecture it makes no sense to create tunnel vision on and blindly accept such a diversely opinionated rhetoric as you are presenting.

We are Architects, not sheep.”
The discussion that followed on the listserve in response to the student’s concerns above focused on the response to CO2 and climate change, but is applicable to any number of conflicts broached in the classroom regarding sustainability themes. Each of the following arguments is suggested, in response to the listserve posting, to be discussed in class, specifically addressing alternative views in a classroom setting. The first approach proposed on the listserve is to create an emphasis on evidence-based decision making. Another non-study participant notes in a posting, “Humanity has a tough choice; we have to weigh the evidence, and do the best we can with what we know and believe, and its possible we’ll make the wrong decision, or implement it in such a way as to create new undesirable consequences that we’ll have to fix later.”

Second, it is suggested that evidence be drawn specifically from other issues, such as resource demand and supply, energy security, and health issues stemming from burning coal and oil. These issues are related but not specific to CO2 emissions, shifting the focus from CO2 to other environmental concerns. This approach to conflict uses a holistic view of sustainability, illustrating that many issues are interconnected, with many root causes and many final impacts.

As a third option, peers suggest noting that often the evidence desired to support one side of this argument is unearthed through research later in time, as evidenced in a recent report relating dramatic reductions in heart attacks to smoking bans. In this form of rebuttal,

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7 Posted on Monday, September 28, 2009 at 12:59 PM.
supplemental, strong evidence only came to light after preventative measures had been put into effect; there may be no other appropriate way to gather the necessary data.

A fourth response to this conflict on the listserv from participants’ peers proposes that the question of human contribution to increasing CO2 levels, as the student addressed, does not actually matter. He states, “...logic tells me that whether or not we are the only cause, we are not helping things by continuing the way we are.”9 Similarly, one posting suggests that designers should take responsibility for how designs produce and use energy, and fully understand the impacts of implemented strategies, period. In other words, regardless of whether designs increase CO2 emissions or not, other results are also detrimental, are related to emissions, and should be evaluated or their own accord. Understanding the full impact of designs independent of reputed causes of climate change is the responsibility of the architect.

The last posted response is - Why not? A peer posts,

“A very simple rationale that I’ve used in the past is the parable of the ant and the grasshopper. The ant busily plans ahead, building up reserves and resiliency, and becomes more self-sufficient. She has an actual plan to address the coming ‘winter.’ The grasshopper prances about, gorging himself on available resources, without a care in the world for what happens once the bounty is gone. We can, as individuals and as a society, either be ants or grasshoppers. There is no penalty for ant-like behavior, and quite possibly a world of good. Grasshoppers will not last.”

9 SBSE listserv, Monday, September 28, 2009 at 2:27 PM
Each of these peer-responses to conflict in the classroom, while different, provide the student with a broader context and scope to critically assess and understand various perspectives on a given environmental issue. Participants feel that these strategies present students with encouragement to critically view different positions on the breadth of topics included within the realm of sustainability and the greater context.

6.2.4. **SQ4: Discussions**

**SQ4: How are sustainability and green building themes discussed in courses and conversations within the college?**

There are a number of conversations that impact the implementation of sustainability themes within architectural programs. The primary concerns with participants are conversations among their faculty, as well as with department and college administration. Other important levels of conversations are with students, practitioners, the larger university structure, and peers at other institutions, though these are less influential.

Participants feel that conversations within the faculty are some of the most important. Many of the participants experience overwhelming support for sustainable themes within courses, while a few encounter superficial endorsements for proposed integration. For those that experience uniform support, conversations typically segue into how to embrace themes at different levels of instruction, as well as within different course subjects. Those faculty experiencing shallow support, or a variation of greenwashing, feel frustrated that sustainability and green building issues never seem to compete with the significance of other faculty conversations, for instance around design theory. Depending on their individual situations, participants either feel lucky to be in a program that accepts the issues as
important and moves forward, or are frustrated that there is little acknowledgement or support for environmental topics. Participants in the latter position feel that they incorporate these themes as they see fit within their courses, trying to engage students and push their interests, regardless of how the other faculty view the issues.

Similar feelings are present regarding administration. While most participants relay that their program leadership understands the currency of sustainability within the profession and with students, some participants feel jaded or that they are often mislead based on the lack of follow through and accountability on behalf of their administrators. Faculty members that are at programs where sustainability threads are truly integrated indicated that their chairs and deans are valid supporters of the sustainability movement. Participants that are not a part of such integrated programs feel that the support indicated by their leadership is shallow, and that faculty members are rarely held accountable for any integration suggested at faculty meetings or in related initiatives. As a result, no larger movements of integration are witnessed in these programs.

Participants have differing views on conversations with their peers at other institutions. For the majority, peer conversations are approached as collaboration and support groups, where the faculty members talk about their interest in sustainability with others in similar positions and with similar interests. These conversations include progress that is or is not being made at home institutions; concerns about their programs or peers at their specific institutions; ideas for the incorporation of different projects or methods; or opportunities that they can pass along to their students. Such conversations also host discussions regarding assessment of and consistency among methods and targets; curricular
and support needs are identified, and initiatives are developed to meet those needs. Though most of the participants see larger peer groups as helpful and supportive, others view them as “preaching to the choir” and spending valuable time talking about sustainability initiatives with groups already on board and that are not the target audience. These participants would rather transfer some of their time to working with other populations, possibly faculty on the fringe of the movement that have not made their way into the sustainability fold.

Participants feel that students are undoubtedly interested in sustainability and green building methods. Most of the participants’ conversations with students address resources, understanding new concepts or technologies, or how the students can become involved with a sustainability initiative or project. Students are often seen as pushing the issue, and require a response from the faculty, complete with continuing education.

When participants have conversations with practitioners about sustainability and green building, they typically find exceptional interest in the subject. They each believe that practitioners understand the need to include green building themes within their work, and many practitioners feel that students as a whole are not being adequately prepared to address evolving concerns in the profession. Note that these comments from members in practices are not directly related to the participants’ specific programs, but to architectural education in general.

Participants largely view conversations at the university level as formative and exploratory. While some universities are more involved with the development of sustainability initiatives than others, each participant feels that there are programs under discussion at a larger level. Many participants are involved directly with university
initiatives, and while these involvements are viewed as beneficial, they often do not feel that there is a translation of interest from the university level into their specific programs or courses. Similarly, while the participants are technically representing their department on university-wide committees, there is not much involvement or support of larger campus initiatives in their architecture programs.

Participants are non-committal when addressing the use of specific terms used in conversations around sustainability. Many share concerns with the use of identifiable terms such as sustainability, green building, regenerative, etc., as they believe that these terms hold different meanings for different people with different backgrounds; there are no consistent definitions or assessments of these terms or implementation. While some participants like to use all terms available, other participants explicitly use no terms and prefer speaking about strategies and end goals, such as energy efficient or high performance. Regardless of the terms being used or not used, individuals express the need to actively listen to the others during conversations to understand what type of design they are talking about, without relying on often misused popular terms. This allows the study participants to understand both perspectives in the conversation and align them internally, enabling them to respond appropriately and accurately without relying on standardized, over-used, misunderstood popular terms. This active listening component increases the ability for faculty members to understand student interests and potential opportunities for engagement.

With regard to conversations surrounding sustainability in their design programs, study participants feel that the most difficult and frustrating conversations are with members of their faculty or leadership. Unless the participants are at a program that has holistically
integrated these themes, which are notably few, having substantial conversations about this type of integration with other faculty members is frustrating and extremely difficult.

6.2.5. SQ5: Legislation and Policy

SQ5: *How is policy and legislation addressed in courses and conversations with faculty and students?*

Because there are increasing regulations, incentives and policies being enacted at the local, state and federal levels that can have a direct impact on the creation and environmental impacts of buildings, these issues are frequently increasing in architectural dialogue. However, the issue of legislation and policy is never introduced in the interviews by faculty as an integral part of their educational method, illustrating that participants do not prioritize these conversations in courses.

When these topics are specifically addressed through a direct question, most participants agree that they are important issues, but that there is no easy place to include them into the educational format. Legislation and policy issues are seen as an overlay on the current complexities of architectural education, and have not yet reached an imperative level for inclusion.

Participants feel that by teaching the fundamentals of sustainable design, through whatever terms and methods they decide to use, their students are - by default - learning to address legislation requirements in their process and product. In other words, participants largely believe that legislation and policies are being developed to nudge the profession forward to a level of environmental consciousness; by providing their students a solid
foundation in environmental issues, that governmental nudge is not necessary and can be overlooked at the education level.

It is agreed, however, that students should be aware of legislation, laws and policies, just as they need to be aware of building codes and the associated impacts. While these criteria are reviewed in courses and curricula, they are not a primary focus at the foundation of the education.

6.2.6. SQ6: Barriers

_SQ6:_ What are the biggest barriers to the integration of sustainability and green building into architectural courses and curriculum? Are they primarily within the specific program, the larger university structure, or both?

Participants perceive a number of barriers regarding the integration of sustainability within architectural education. Because architecture is complex, rigorous, and steeped in history, there are many contextual and cultural factors that some participants view as at odds with progress in integration. While some note that they believe there are no “real” barriers and only faculty themselves are holding the movement at bay, participants understand that faculty are an integral part of the culture that has been created and supported. Some participants are reluctant to place blame on the established culture of the education, while others are not hesitant to rebuke the educational status quo of studio and curriculum structure.

The larger university setting, as referenced in Table 3 in Chapter 5, does not affect the ability of programs to incorporate sustainability themes. Participants work with what they are given and bring in outside expertise as they see fit. Similarly, types of programs
housed under the same umbrella are also not an indicator of success in this study. However, faculty, and often department administration specifically, are felt to be substantial barriers for integration. The distinction is often made between studio faculty and environmental controls faculty, as discussed in Section 6.2.1. SQ1: Course Structure, with the claim that studio faculty have more of an impact on student learning and engagement because of the emphasis on studio courses. These discussions surround the division of design and non-design faculty, or studio and building science concentrations. Some study participants recount frustration after seemingly in-depth conversations about initiatives are had with the faculty, but do not result in accountability.

This leads to exploring different value development within programs. Some participants are at programs where the faculty body shares a common philosophy regarding the integration of sustainability themes, while others feel their support structure is smaller and at times lacking. Participants at programs with a larger support structure feel that this is highly beneficial to the integration process and progress. Others at programs with diverse philosophies, such as those valuing formal design theory, find that faculty disconnects often lead to difficulties.

6.2.7. Central Questions

As the primary themes that emerge from the study, the central questions tie subquestions themes together, and incorporate all found categories within the data. While most grounded theory studies result in only one central question, the complexity of this topic requires exploration at two levels: the (micro) methods of individual instructors, and the
Central Question 1:

**How is student engagement being facilitated to successfully incorporate sustainability and green building into formal architectural curriculum?**

This grounded theory study is designed to extract detailed narratives of personal experiences from leading faculty regarding their methods of incorporating sustainability into architectural curriculum. Throughout the interviews, various personal concerns dependent on the participants’ individual experiences are revealed. Because of the breadth of the topics included within architectural education and the fairly confined availability of the subjects, many of the interviews were firmly guided through the topics. All participants were candid and open with their thoughts and feelings, occasionally seeming hesitant, but never appearing to withhold information or perspective.

Through these interactions, it was found that sustainability themes are being incorporated successfully in a number of ways throughout programs in the United States, though most successful incorporation methods revolve around student engagement. It is understood, however, that different participants’ situations and contexts are complex and layered. Participating faculty members are primarily teaching within these successful examples with a philosophical dedication to energy efficiency and holistic sustainability. Individual methods are focused primarily around student engagement, followed closely by integrated curriculum. Participants are increasing student engagement in the realm of sustainability in a number of ways including:
- Personal experiences through formal and informal research efforts
- Experimentation and exploration of sustainability topics
- Participation in and attendance at conferences
- Travel to various urban/rural/international locations
- Assignments based in real-world problems
- Leadership opportunities

Student engagement is a focal point of each participating faculty member with the intention to critically engage students in their learning process. Participants are not interested in perpetuating the traditional instruction method of passing on a given set of criteria for student implementation. This common perspective is closely tied to the notion that the context of design is constantly changing and that the profession, and therefore education, needs to change with it. Participant narratives support previous literature on student engagement, which notes that highly engaged students perform better academically and are happier with their educational experiences (Hayek and Kuh 2002; Kuh 2005; ACLS 2007). Because design is a service-oriented profession, the realm of student engagement in this context refers to involvement in real-world applications beyond the confines of the university and the classroom.

To fully capitalize on the possibilities for student engagement and sustainability integration, participants believe that faculty should unanimously support this assimilation. Though this type of program is the case for a small percentage of the participants (30%), the remaining participants feel that the level of faculty involvement and the lacking initiative of peer faculty to be a major barrier to the integration of sustainable themes into their programs.
As previous faculty conflict literature points out, when alternate goals are present in academic programs, educational initiatives can suffer (Copp 1994; Novicevic, Buckley et al. 2003). As noted by Novicevic, et al. (2003), collaborative teaching and modified goals could be threatening through blurred teaching outcomes, roles and responsibilities in the classroom.

Central Question 2:

*How can the architecture discipline be reinterpreted to successfully incorporate sustainability and green building into formal architectural curriculum?*

Though focused on personal experiences from leading faculty regarding their specific instruction methods for incorporating sustainability into their courses, a strong theme emerges that addresses the need to craft a curricular response to the environmental demand for a new worldview in architectural education. In-depth conversations with expert participants reveal that there are a number of areas within the established educational approach that can encourage the integration of sustainability themes within architectural programs.

Participants believe that the challenges addressing the environment are larger than can be addressed by the architecture profession alone and necessitates interdisciplinary efforts. Framing environmental problems as holistic issues within architectural education requires the field to connect with other complementary disciplines within the university and beyond. Increased exposure to other disciplines is viewed as an important contribution to realizing sustainability integration within architecture programs. Despite the history and established educational culture of seclusion and isolation, participants feel that experience with other disciplines is important for environmental success. By understanding the holistic
nature of environmental problems, and ultimate downfalls of singular design philosophies, students are better equipped to understand and appreciate the importance of interdisciplinary design and fold this new understanding into their developing design process.

The role of studio in design education is unanimous and accepted. Participants feel that the creative space provided in the studio setting, partnered with the possibilities for process, subject integration and addressing comprehensive design issues, is important to the students’ development. However, participants acknowledge certain boundaries created by the studio structure. Specifically, the unique structure and organization of the studio setting makes it difficult to incorporate other fields and experts into such an important course. Engaging another discipline such as engineering, for example, that is not familiar with the time allotment and creative space of studio has difficulty participating in studio classes.

Studio courses, while the core of architectural curriculum, are recognized as the academic venue for the assimilation of information provided in other subjects, such as structures and theory, with design process. On the other hand, participants feel that the studio is treated as separate in the traditional approach to curricular structure and studio instruction. In other words, studio courses are not often specifically tied to other courses in the same semester. While there are comprehensive studios, studio courses focus on design theory, form-giving and design process without consistent influence of support classes elsewhere in the curriculum; while promoted as the venue for integration, studio courses often remain isolated by design faculty with systems integrated as the studio instructor sees fit. By implementing a pairing of courses, specifically studio and a seminar or lecture where an issue is explored in depth, with both taught and overseen by the same faculty, information
is covered in one course, such as a seminar or lecture, and applied in studio. The continuity of the faculty can ensure that consistency and implementation is being achieved. Participants feel that this iteration provides an increased emphasis currently lacking in architectural education.

Participants, including the negative case interview that is included, all feel that architectural education is internally divided between “designers” and “non-designers.” This implies differing value systems among faculty, determining how different priorities are ranked within curriculum and individual instruction methods. While some participants appreciate differing philosophies and approaches to design, they feel that a common thread should be established as a baseline concern addressing the increasing environmental concerns that the profession must face. Participants do not feel that a unanimous approach to design is necessary, but they do feel that common goals should be established, both by individual programs and larger stakeholders, such as the accreditation body and industry organizations.

Though there is a rigorous accreditation process for architectural education, study participants feel that sustainability is not adequately addressed in the current requirements. There is a need for substantial definitions, established baselines and assessment methods. Some participants feel that the refinement and inclusion of these criteria within the accreditation requirements is not a necessary factor, while others feel that more substantial guidelines can help; rigorous criteria would require compliance by programs and provide sustainability champions in individual programs support to encourage his/her faculty to move forward in integration initiatives. It is difficult to integrate ideas and methods into courses and curricula without established definitions, requirements and standards.
The field of architecture and design is a **constantly evolving discipline**, including changing contexts, spheres of influence and concern, increasing responsibility, and rapidly advancing materials and strategies. While participants understand and value the history and rigor of architectural education, they also believe that the educational structure can be stagnant, adhering to tradition and status quo in project selection, structure and expertise. As evidenced in their selected course topics, projects, and initiatives, participants feel that the academy must be more connected to the profession. This strengthened relationship enables educators to modify their standards and methods to meet the changing demands on the profession.

6.3. Implications for Educators

Through in-depth interviews with leading sustainable design faculty in the United States, two primary themes emerge, addressing different levels of concern in architectural education: **student engagement** at the instruction methods level, and the need for **reinterpreting the discipline**, which speaks to considerations in the larger philosophical approach to integrating sustainability. This section reviews implications for architectural educators interested in applying insights from this study in their own programs.

Architectural educators and program administrators can consider the insights from this study for application in to their own school context and setting. The participants of the study favored engaging their students in initiatives and activities outside the traditional confines of the classroom and the university, at different levels and with varying results. It is suggested that programs review their own curriculum to assess the extent of student engagement beyond the traditional role. A number of variations and opportunities are
presented to increase student involvement in an effort to connect students with sustainable foundations.

Cultural and organizational issues surrounding the discipline are important to consider when looking at sustainability integration. Specifically, a curricular response should be crafted that addresses the creation of a new worldview in architectural education. Through the exploration of leading architectural educators in the field, this research has identified a number of areas as fundamental to a curricular shift. Areas of impact that should be taken into consideration include:

- The division of the discipline between art and science
- The rapidly changing demands of the profession
- The role of studio in the educational process
- Varying faculty identities and philosophical conflicts
- Differing communication patterns between players
- The contrast between theory and applications/strategies

Each of these trigger points can be modified to address concerns at three different levels: individual faculty, a cohort of faculty, and at the accreditation level. Specifically, at the individual faculty level, the following should be considered:

- Use real-world projects where applicable.
- Integrate sustainability themes into studio courses.
- Establish a framework to help students understand and control complexity.
- Emphasize process and decision making in partnership with the end product.

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Encourage students to examine and experience existing buildings.

Invite other disciplines into courses when possible.

At the program level, or in a cohort of faculty, the following can be considered:

- Partner studios with focused lecture or seminar courses, such as ECS.
- Integrate sustainability themes as a standard into studio courses.
- Address sustainability early in the students’ educational journey.
- Ask all courses to identify three ways in which sustainability is incorporated.
- Establish partnerships with other disciplines.
- Open courses to other disciplines.
- Encourage students to explore courses within other disciplines.
- Establish an inter-disciplinary sustainability certificate.
- Create a task force to focus on engaging other disciplines on campus and beyond.
- Cross-train faculty: partner design and non-design faculty for initiatives.

While most of these implements must happen at the individual program level, there are a few things that could be considered at the accreditation level including:

- Identify impact areas and address these areas appropriately in visits, discussions and guidelines.
- Emphasize sustainability elements in accreditation criteria.
- Establish levels of integration, so that individual programs can begin to understand their effectiveness.
Faculty members interested in this topic and reading this study are encouraged to reflect on their own individual situations and look to understand what parallel themes may exist. The primary theme of student engagement is an initiative that could potentially be incorporated or extended in all programs, starting at the individual assignment level. Readers can explore their specific situations to see if/how students are being engaged, and if there are opportunities to increase levels of student participation. If the individual situations are less than optimal, consider the additional following specific possibilities:

- **Facilitate a faculty conversation on sustainability integration:** If necessary, bring in a third-party to talk about possibilities, barriers, concerns and opportunities in your specific faculty.

- **Engage students in research:** This research can be applied or academic, raging from case studies as coursework to more in-depth assessments and comparisons.

- **Empower students:** Encourage students to participate in extra-curricular activities on campus and beyond, specifically in leadership roles.

- **Revisit your curriculum structure:** See how sustainability themes could be incorporated into each course, or how existing courses can better relate to each other for larger themes.

- **Open dialogue with other disciplines:** Try a pilot interdisciplinary project and see how it plays out, then use it is a building block for future activities and courses.
Each of these small steps can have big returns in terms of sustainability integration within specific programs. While each program is different, these opportunities can be modified to fit an individual program’s needs.

6.4. Implications for Future Studies

Researchers interested in the integration of sustainability and green building themes within architectural education should continue to unravel the complex context of architectural education. Areas of further research include:

- Understanding negative cases and opposing viewpoints within architectural education.
- Exploring the growing field of student engagement, and how themes from that field can be overlaid on architectural education.
- Investigating the myriad of terms in the field, connotations and popular uses, including how they are shaped and perceived.
- Consider the development of assessment methods, including what currently exists, what is being developed and potential goals.
- Documenting and exploring community engagement in architectural education, including the methods, projects, results and student impacts.
- Exploring potential boundaries and considerations for developing a faculty identity within the context of architectural education.
- Communication patterns within architectural education and the profession, and how they differ depending on various participants.
- Explore and document interdisciplinary efforts in academia, specifically within architecture and related fields.

- Understanding role of studio as the core of design education, how other courses can interact with this core, and addressing barriers and opportunities for curriculum partnerships.

Architectural education is becoming increasingly reflective, looking at internal processes, structures, influences and cultural constructs. Future efforts should take the constantly changing context of the profession into consideration, and include sustainability and environmental themes into these deliberations. Including these factors into the revisioning process will provide a sound foundation for the future of architectural education. The scope addressed should be holistic, and welcome all related avenues of exploration within the profession, including systems thinking, design process, form-giving, user needs, and environmental considerations. According to the results of this study, architectural education remains primarily encapsulated and traditionalist, with the most promising opportunities hinging on increased conversations both internally and externally.

In conclusion, this study supports the notion that the inclusion of sustainability themes within architectural education is complex and multi-faceted. Interested faculty members are exploring ways to provide substantial, holistic information to students, while still positioned within the boundaries of the constructed architecture and design culture. The identified issues vary for each program, and are highly modifiable depending on context, faculty, university setting, initiatives, and student body. However, when looking at the incorporation of sustainability themes, integration should be explored at two levels:
individual methods used in courses and the philosophical approach of the program and profession. In partnership, these two perspectives provide the most promising opportunity for the integration of sustainability themes within architectural education.
REFERENCES


ACLS (2007). Student Learning and Faculty Research: Connecting Teaching and Scholarship, American Council of Learned Societies.


APPENDIX
APPENDIX A

Data Collection Procedures

(1) Identify participants and contact to verify their willingness to participate.

(2) Arrange for the primary researcher to visit with each faculty, with between two-to-four hours reserved for an in-depth interview with the participant.

(3) Before starting the interview, review the consent forms together and have the participant sign two, one for each of you.

(4) Ready the recording devices and ensure that both are working properly.

(5) Begin the interview, guided by the previously crafted interview guide. Even if the interview diverges from the guide, be sure to touch on all necessary topics.

(6) At the completion of the interview, thank the participant and review the follow-up procedures.

(7) Before leaving the site, ensure that the audio recordings are working.

(8) Also before leaving the site, be sure to make any observations or review any documentation that must occur onsite.

(9) After transcribing, send the transcript to the participant for member-checking and incorporate any alternations or clarifications.
Hello, Professor ***omitted** -

I hope all has been well for you this summer. My name is Traci Rose Rider and I am working on my PhD in Design at NC State University, focusing on the integration of sustainability and green building within formal architectural education. This is a grounded theory study involving in-depth interviews with a number of faculty across the country to better understand their views and experiences involving sustainability within architectural education. From conversations on the **omitted** listserve, I believe that you are interested in the topic and hope you would be willing to spend a few hours with me discussing the issue.

First - would you be willing to participate in my study as an anonymous participant?

If so, I wondering about your schedule in October. Specifically I am looking at Thursday, October 8 or potentially Friday or Sat, October 9/10 for a trip to ***omitted***. I anticipate the interview being approximately 2 hours depending on your thoughts and the general flow of the discussion.

Please let me know if you have any questions. I appreciate your time and look forward to hearing from you at your earliest convenience.

Thanks so much again for your time!

Traci
APPENDIX C

Pilot Study Findings

In conducting the pilot study, it was interesting to see how many topics were associated with the main subject of sustainability in curriculum. Many of the conversations became focused on personal belief systems, as well as very specific personal experiences. While I was concerned that I was asking very general questions, it turned out that the large scope and broad brush allowed the participant to craft their response to their own experience. Therefore, I maintained many of the larger, broad questions.

I also learned that I would need to be very conscious of getting too far off topic, and understanding how to bring the participant back to the main question smoothly. There is a good deal of passion behind the answers and questions, and that passion should be maintained throughout the interview. However, I need to be conscious about the possible (but hidden) applicability of the participant’s answers. I do not want to steer them back to “on topic” too soon, or I could miss something important that I am unaware of. Because I am not an expert in this field, it may be that I do not yet know what is important and what is not. That is something that I need to be very aware of.

The pilot study helped me to understand the wealth of information that will surface during interviews. This is fantastic for the study, though I was unaware of just how the actual practice of interviews would hash out. The study was incredibly informative and helped me solidify my approach to the participant interviews.
APPENDIX D

Initial Interview Guide

Introduction
• Greet the participant and thank them for their time.
• Review consent forms and have the participant review/sign – keep one.

Larger perspective
• How do you perceive the integration of sustainability into an architectural curricula?
• How do you feel sustainability is best incorporated into architectural curriculum and courses?
  o What courses do you feel best allow for the integration?
  o What courses don’t?
  o What projects do you feel work/don’t work?
• Why do you feel this approach is best? How do you know it is successful?
• How do you feel the type of university structure might impact the integration of sustainability into architectural curriculum?
• What do you think about the conversations surrounding sustainability and green building within architectural education? Are there important connotations and terminologies in play?
• What role do you feel architects play in the realm of sustainability? (Advocates, leaders, facilitators, experts, specialists, etc.)

Specific Experiences
• What have been your experiences with the integration of sustainability into courses and curriculum?
  o What elements do you feel are most necessary to be successful?
  o What do you feel is most important?
  o What types of conversations do you have surrounding the topic in your program:
    ▪ with peers?
    ▪ with heads of departments?
    ▪ with peers at other institutions?
• What types of conversations do you feel are necessary to have regarding sustainability and green building – both in the classroom and with faculty?
  o Who needs to be around the table for these conversations?
  o How do we get these people around the table within courses?
  o When do we introduce interdisciplinary themes? How much do we introduce?
• What do you personally feel are the biggest barriers to sustainability being a constant theme in architectural education?
• How do you feel that sustainability is incorporated into the NAAB Accreditation requirements?
• What is your school’s perspective on meeting the NAAB requirements?
  (Prescriptive, suggestive, guidelines, etc.)

Closing
• Is there anything else you’d like to talk about that we haven’t covered?
• Record gender and age.
• Ask of the participant would be willing to discuss themes and findings, or acting as a co-researcher.

Thank them for their time.
APPENDIX E

Sample Course Outline and Syllabus - Jared

Arch XXX
GREEN ARCHITECTURE SEMINAR:
Designing for Environmental Sustainability and Human Health

As demonstrated by the success of the LEED (leadership in Energy and Environmental Design) rating system, topics such as indoor air quality and storm water management represent the cutting edge of environmental technology and ecological concern in architecture. These concerns both expand our vision outwards to the distant impacts that the construction industry has on the health of the planet, and focus our attention inwards on the health problems associated with the contemporary built environment. The expertise required to effectively address these issues touches on all aspects of design.

This seminar will offer a detailed introduction to issues of human health and environmental sustainability in architectural design. The course will consist of a combination of lectures, seminar discussions of assigned readings and related activities. The course will be oriented towards achieving a basic level of technical and ecological literacy relevant to design applications, and will cover both residential and commercial/institutional scale construction.

Required: Arch. XX: Architecture & Environmental Response.
Recommended: Arch. XX: Illumination and Thermal Comfort

READING LIST

PEDAGOGICAL GOALS (as defined by the ACSA guidelines)
Environmental
11. Be aware of principles and theories that deal with environmental context, and the architect's responsibility with respect to global environmental issues.
12. Understand how a specific site influences, and is influenced by, its physical characteristics and its ecological context
13. Understand the ecological impact of buildings and their occupants.
Technical
24. Understand the basic elements, organization and design of mechanical and electrical, plumbing, communication, security, and vertical transportation systems.
25. Be aware of the principles, conventions, standards, applications and restrictions associated with the manufacture and use of existing and emerging construction materials and assemblies.
26. Understand safety requirements and selection processes for equipment and materials in site and building design.
27. Understand the problems related to the use of hazardous and toxic materials in new and existing buildings.

Design
36. Be able to select building materials and assemblies as an integral part of the design and to satisfy requirements of building programs.
38. Be able to use the interactions between technical, aesthetic, and ethical values in the formation of architectural judgments.

Practice
47. Be aware of the roles of value engineering, life cycle cost analysis, and construction cost estimation in the framework of a design project.

ASSIGNMENTS
As a graduate level seminar, this course is an arena for critical thinking and for the sharing of knowledge and ideas amongst equals. For this reason alone, full participation is vital to the class.

• Discussion of the weekly readings and class participation in general will account for 50% of your grade.
• Term Project- Two interim reports to the class on your term paper research will account for 10% and 15% of your grade respectively, with the final paper accounting for 25%.

You will be divided into teams of 2, with each team leading weekly discussion on one of the topics for the day. To prepare for the discussion, each team member is responsible for writing 3 questions drawn from the particular reading that they are responsible for (or you can work together and submit 5 total). These questions must be e-mailed to me by 6pm on the Monday before the Tuesday class… I will select 5 of the best questions each week for a 10-minute quiz on the material that will occur first thing on the session FOLLOWING the session in which it is discussed.
GREEN ARCHITECTURE SEMINAR:
Designing for Environmental Sustainability and Human Health

INTRODUCTION
1. Class 1
Defining green architecture
READING: EBN

INDOOR ENVIRONMENTAL QUALITY
2. Class 2
VIDEO: Trade Secrets: A Bill Moyers Report (view before class. Typical)
Healthy Housing: Housing for the Chemically Sensitive
READING: EBN
   Introduction to IAQ/MCS packet
   Wasley, “Homes for People with Multiple Chemical Sensitivities” Encyclopedia of Life Support Systems.

3. Class 3
VIDEO: Blue Vinyl
GUEST LECTURE- [Omitted], [Omitted] Home Inspection.
Healthy Housing: Moisture Control, Ventilation and Combustion Safety
READING:
   EBN
   Mold in Buildings: What it is and How to Keep it Out. Vol. 10 no. 6.
   “Ventilation” packet
   Lstiburek, Joseph. EEBA Builder’s Guide: Cold Climates:
   Introduction
   Ch. 1: The House System
   Appendix I: Rain and Drainage Planes
   Appendix II: Air Flow Retarders
   Appendix III: Insulations, Sheathings and Vapor Diffusion Retarders
   Appendix V: Air Leakage Testing, Pressure Balancing and Combustion Safety

4. Class 4
DUE: Term Project Ideas: 10 source Bibliographies.
VIDEO: Pennsylvania’s First Green Building
IEQ in larger buildings
READING:
EBN
Construction IAQ Management: Job Site Strategies for Ensuring a Healthy Building. Vol. 11 no. 5. Feature Article
Design for Cleanability. Vo. 14. no. 9. Feature Article
Building Commissioning: The Key to Buildings that Work. Vol. 9 no. 2. Feature Article

REDUCING ENVIRONMENTAL IMPACT
5. Class 5
VIDEO: Saviors of the Forest
Resource Conservation: the example of wood
READING
EBN
Tropical Timber: seeing the forest for the trees. Vol. 3 no.5 Feature Article.
Wood Issues packet
  Question to answer on the FSC Website- which building won the 2007 ‘Designing and Building with FSC’ award?

6. Class 6
VIDEO: Treated Lumber news clips
Resource Conservation: the example of wood
READING
Natural Capitalism, Chapters 1-5
EBN
Treated Wood in Transition: Less toxic options in preserved and protected wood. Vol. 15, no.8 Feature Article
Wood Issues packet- Timbersil story. (search Timbersil on BuildingGreen for these short news pieces)
TimberSIL Nontoxic Pressure-Treated Wood
  Product Review from Environmental Building NewsOctober 2004
BuildingGreen Announces 2004 Top-10 Products TimberSIL™ Nontoxic Pressure-Treated Wood
Awards & Competitions. December 2004

TimberSIL in Trouble
What's Happening from Environmental Building News October 2006

TimberSIL Business Rebuilding
Product News from Environmental Building News January 2007

7. Class 7
VIDEO: Audubon House
VIDEO: The Making of the Energy Resource Center
Waste Reduction and Construction Site Recycling
READING
EBN
Dealing with Construction Waste: Innovative Solutions for a Tough Problem vol. 1 no.3
Deconstruction: Back to the Future for Buildings? Vol. 9 no.5 Feature Article.
Designing for the Long View: Flexibility, Adaptability, Durability and Deconstruction

READING
EBN
Future Proofing Your Building: Design for Flexibility and Adaptive Reuse. V.12 no.2.
Structure As Finish: The Pros and Cons of Leaving Off Layers. Vol. 9 no. 3. Feature
Article.
Design for the Long View Packet
Stewart Brand. How Buildings Learn. Ch. 12: Built for Change

8. Class 8 cancelled

9. Class 9
DUE: Term Paper/ Project Progress Presentations

10. Class 10
VIDEO: Restoring the Waters
Potable Water Conservation and Wastewater Treatment
READING
Natural Capitalism, Chapters 6-11
EBN
Water: Conserving this Precious Resource. Vol. 6 no.3 Feature Article
Ecological Wastewater Treatment Vol. 5 no.4
On Site Wastewater Treatment Vol. 3 no.2

11. Class 11
VIDEO: Rivers and Tides
Stormwater Management
READING

Natural Capitalism, Chapters 12-15
EBN

Cleaning Up Stormwater. Vol. 10 no.113 Feature Article
A Garden Overhead. Vol. 6 no.83 Feature Article
Porous Pavement: A Win-Win Strategy Vol. 13 no.9 Feature Article
Rainwater Harvesting Vol. 6 no.53 Feature Article

TOOLS FOR INTEGRATIVE DESIGN
12. Class 12
VIDEO: Green Plans
Assessment Tools
READING
EBN

Life-Cycle Assessment for Buildings: Seeking the Holy Grail. Vol. 11. no. 3 Feature Article.
Cradle to Cradle Certification: a peek inside MBDC’s black box. Vol. 16 no. 2 feature article
Rating Systems Packet
LEED 2.2 Checklist (Checklist and supporting documents available at
http://www.usgbc.org/programs/index.htm)
David Eijadi et. al. “Introducing comparative analysis to the LEED system: A case for rational and regional application.” PDF Available in class folder
Living Building Challenge

13. Class 13
VIDEO: Building Sustainability with the Natural Step: UT-Houston’s Journey
The Environmentally Oriented Practice
READING
EBN

Integrated Design Vol. 13 no. 11 Feature Article
Productivity and Green Buildings. Vol. 13 no.10 Feature Article
Sustainability and Building Codes. Vol. 10 no.9. Feature Article.
The Environmentally Oriented Practice packet


14. Class 14
The Social Construction of Green Building

246
READING
EBN
Biophilia in Practice: Buildings that Connect People with Nature Volume 15 > Number 7
The Social Construction packet
Excerpts from “Sustainable Architectures: Cultures and Natures in Europe and North America” by Guy and Moore to be posted.
APPENDIX F

Sample Course Syllabus - Barry

Comprehensive Design Studio

This project is the third in a series of comprehensive studios undertaken in response to Ed Mazria's challenge to the architecture profession to produce carbon neutral buildings by 2030. His case is well-articulated on his web site www.architecture2030.com. Both the AIA and the Association of US Mayors have endorsed Mazria's challenge. Mazria believes that each year in the U.S. we tear down about 1.75 billion square feet; renovate 5 billion, and build 5 billion. Therefore, in 30 years 300 billion square feet will be renovated or built new; that's about 75% of the built environment. If this is accomplished with carbon in mind, global warming can be controlled.

This studio will work on the proposed [omitted]. This project is an on-going effort. The firm of [omitted] has developed three schematic design proposals for the building. Each design team will act as site architect to further develop one of the schematics to fulfill the requirements of our comprehensive design studio. Principals from [omitted], serving as design architects, will visit the studio on Mondays to critique student work and help with design development.

Schematic design proposals and other site and building info is available on the shared drive [omitted].

[Design architect’s] thoughts on the studio:
"The studio will be an integrated studio comprised of architecture, landscape architecture and engineering students. The working groups would be put together similar to consultant teams in the professional world, but with less definition of roles (at the beginning). A program and schematic design proposal would be given to each student team. There are two points of emphasis that I would like the studio to focus on:

• Integrated Design - different disciplines working together to generate a design solution for the project. I anticipate that once the teams selected a design direction and began developing the project, the architects would have to keep the overall project moving forward and coordinated while the landscape architects would develop the site and the engineering students would be charges with testing and analysis of the proposed solutions. We obviously need to talk more about this and work with [omitted] to ensure the proper role for the engineering students and task them with work they can perform.

• Schedule/Generating Work – eschewing a traditional academic studio schedule and implementing a working schedule that more closely resembles the professional world. Less time to generate design options, shorter duration to react to comments
and generate new solutions and more emphasis on testing and analyzing the proposed design solution. Your studios have always been great at producing ‘product’. I would like to provide the students a taste of a real (ish) project schedule with deliverables as I believe this will provide greater exposure to the professions they are entering.

- Weeks 1-2 – get familiar with program and site and generate Integrated Project Goals.
- Weeks 2-5 – produce design options that meet the program and performance goals. Meet with design architect (me) and present. Adjust to client needs and feedback.
- Weeks 6-8 – select a design option and building systems, develop and quantify. Present to client and outside critics.
- Weeks 9-10 – Each discipline refines and completes their work, integrates into project and tests, analyzes and quantifies. Stormwater calculations, solar calculations, daylighting studies, energy performance studies, (anything else that we think the students can study and produce results).
- Weeks 11-14 – produce final renderings, plans, models, material studies, energy use - energy generation results. Final presentations w/ critics from [off campus].

My initial thoughts are that I would come out to [campus] once a week (Monday) for deck crits, reviews and to act in a sense as design architect, changing project goals, changing my mind and requiring them to react to my comments as well as working in a traditional studio sense and talking about design and process and building systems. The overall goal is to dispel the myth of the architect as the lone creative genius and replace it with a team focused, integrated process that relies more on team work, testing and research that on the elusive perfect idea."

Our goal is to meet or exceed the project goals and to work toward carbon neutrality and zero net energy.

Students will accomplish a comprehensive design project in two phases (which fits [omitted’s] ideas above):
  - Collective Research and Planning Phase (8 weeks)
  - Team Comprehensive Design Phase (7 weeks).

**Collective Research and Planning Requirements**
This phase simulates the work of an integrated practice where architects, engineers, and landscape architects and their clients and consultants initiate a project and develop its master plan. We'll seek out experts on campus and beyond as well as with our client group and carbon-neutral collaborators to help form our design solutions.
Each student will have the opportunity to present her/his research to the group and will be required to provide a hard copy for the studio. The research reports should include photo credits, references, and sources of further information. Two to five pages are expected. The [omitted] case study draft is a pertinent example.

**Comprehensive Design Requirements**
NAAB defines comprehensive design as, "Ability to produce a comprehensive architectural project based on a building program and site that includes development of programmed spaces demonstrating an understanding of structural and environmental systems, building envelope systems, life safety provisions, wall sections and building assemblies and the principles of sustainability."


Comprehensive design seeks to integrate all major building systems. A successful project will have well-developed and well-integrated schemes for:

<table>
<thead>
<tr>
<th>Component:</th>
<th>Methods of Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Systems:</td>
<td>Annotated diagrams of vertical and horizontal systems</td>
</tr>
<tr>
<td>Building Envelope:</td>
<td>Detailed sections of wall-roof and wall-floor connections. Opaque and glass cladding details. Opaque model of thermal properties of wall and roof systems.</td>
</tr>
<tr>
<td>Environmental Systems:</td>
<td>Diagrammatic of primary and back-up systems for heating, cooling, lighting, and water. Energy Star target for your building type. Thermal model of building performance (<em>HEED</em> or <em>Ecotect</em>). Lighting model as required.</td>
</tr>
<tr>
<td>Spatial Systems:</td>
<td>Diagrammatic of access (ADA?), sequence, overlap, nesting, hierarchy, served, service—all that apply.</td>
</tr>
<tr>
<td>Site Construction:</td>
<td>Show integration of building and site ecology.</td>
</tr>
<tr>
<td>Building Materials:</td>
<td>List of primary building materials with notations on carbon debt calculated (tons) or estimated (none, low, average, high).</td>
</tr>
</tbody>
</table>
Integration of Systems: Conceptual diagram of how systems intertwine beautifully.

**Carbon Neutral Design Requirements**

*What is your carbon emissions intent for this project? How do you define success relative to this intent? What evidence that this intent has been successfully met can be found in this project?*

Show how your project meets Mazria's requirements in all phases of the construction process.

**Final Presentation Guidelines**

The final critique will allow for 20-minute presentations of each individual project. Each designer may choose any combination of media appropriate to her/his project, anything from water colors to physical models, to digital media.

Presentations must address the systems listed above and demonstrate their integration and achievement of carbon emission reduction. A CD containing the final presentation (if digital—ppt or html) and images of all drawings, models, and other materials in jpg or pdf format must be turned in by [omitted].