COLLABORATIVE DESIGN PEDAGOGY:

A NATURALISTIC INQUIRY OF ARCHITECTURAL EDUCATION

A Dissertation

by

KEITH THOMAS MCPEEK

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2009

Major Subject: Architecture

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Approved by:

Chair of Committee,   Robert Johnson
Committee Members,   Rodney Hill
                                  Valerian Miranda
                                  Jennifer Sandlin
Head of Department,   Glen Mills

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ABSTRACT

Collaborative Design Pedagogy: A Naturalistic Inquiry of Architectural Education.

(May 2009)

Keith Thomas McPeek, B.S., Ball State University;

M. Arch., Texas A&M University

Chair of Advisory Committee: Dr. Robert E. Johnson

This research examines interviews conducted with more than a dozen authorities in architectural education on collaborative methodologies utilized in the design studio and identifies factors that inhibit and facilitate the incorporation of collaborative methods in the context of situated learning.

This research explores the notion that the design and implementation of even the simplest architectural projects are almost exclusively collaborative endeavors requiring the expertise of a spectrum of individuals working together to achieve a singular goal. Each of these experts is highly trained in their respective areas, yet few are formally trained authorities in the skills of collaboration, including architects, individuals who are often put at the lead of design projects which include people of varied backgrounds, working styles and areas of expertise.

Historically, the education of an architect has been a highly individualized pursuit, focused on the development of an individual skill set seldom requiring collaboration beyond that of student and professor. While this individualized, hands on approach to

education has been highly revered by many, it often falls short of its potential and fails to recognize that the greatest design accomplishments of humankind have been the undertaking of collaborative enterprise. Furthermore, architecture students are being prepared in a manner that is contrary to the highly collaborative nature of the architectural practice they will enter without taking away from the inherent strengths of the traditional architectural education.

Despite NAAB requirements for collaborative methods in the classroom, and an increasingly collaborative model of professional practice for architects, design education continues to trail woefully behind other disciplines such as business, law, nursing and medicine; each having long ago integrated collaborative study models into their curriculum. This research examines how collaborative methods including intradisciplinary, interdisciplinary and community based collaborations, can be further integrated as a formal part of the overall design curriculum and what factors facilitate and inhibit this inclusion.

DEDICATION

I dedicate this work to my beloved family, Danay, Amelia and Connor. Without your love and support this work would have never been possible. You are the inspiration for all that I do.

ACKNOWLEDGEMENTS

I owe a debt of gratitude to a number of individuals who without their guidance and support this work would have never been brought to fruition.

First, I would like to thank the individuals that gave so generously of their time to participate in this study. I feel fortunate to have had the opportunity to get to know them and build some ongoing friendship as a result. Their wisdom and guidance will have a lasting impact that goes well beyond this study.

I owe a huge debt of gratitude to my friend, committee member and mentor Dr. Valerian Miranda. Your guidance and input on a spectrum of issues over the past nineteen years has been invaluable. This effort would not have been possible without your support.

To my committee chair Dr. Robert Johnson, I say a deep felt thank you! Your guidance as an educator and scholar has set a very high standard throughout this work and challenged me to pursue excellence in all that I do. I am fortunate to have had you as my committee chair and I hope that I will honor your example with my students over the years to come.

I would also like to thank my other two committee members, Rodney Hill and Dr. Jenny Sandlin. Your guidance and input have been invaluable in this effort. I am truly fortunate to have had your support throughout this endeavor.

Another thank you goes to my friend Dr. Walter Wendler. The effort of attempting to complete a dissertation in absentia can, at times, be overwhelming. I was fortunate to have the support of my friend and colleague over the past year as I brought this effort to a point of conclusion. Your assistance is truly appreciated.

The final and most heartfelt thank you goes to my family. Quite simply this work would not have been possible without your enormous sacrifice of time and your ongoing love and support. I cannot even begin to articulate how much you mean to me.

NOMENCLATURE

ACSA	Association of Collegiate Schools of Architecture
AIA	American Institute of Architects
NAAB	National Architectural Accrediting Board
NCARB	National Council of Architectural Registration Boards
SLT	Situated Learning Theory

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1   INTRODUCTION

The design and implementation of even the simplest architectural projects are almost exclusively collaborative endeavors requiring the expertise of a spectrum of individuals working together to achieve a singular goal. Each of these experts is highly trained in their respective areas, yet few (if any) are formally trained authorities in the skills of collaboration. This includes architects, individuals who are often put at the lead of design projects which include people of varied backgrounds, working styles and areas of expertise.

This lack of preparation for working in a collaborative environment continues to occur despite the fact that architects, developers, builders and engineers commonly acknowledge that collaborative skills are a necessary foundation for successful architectural projects and a requirement under current NAAB accreditation guidelines. Cynthia Weese, Dean of Architecture at Washington University in St. Louis states the problem very succinctly – "Many studios deal almost solely with the individual, while complexities of contemporary practice require collaborative teamwork" (Crosbie 1995).

This apparent failure on the part of formal design education to systematically embrace the need for a corresponding collaborative pedagogy has resulted in design education trailing woefully behind other disciplines such as business, law, nursing and medicine; each having long ago integrated collaborative study models into their curriculum (Sackett, Hendricks and Pope 2000; George and Guthrie 2002; Rider and Brashers 2006). While limited in number and informal in application, some strides have been made including intradisciplinary, interdisciplinary and community based collaborations, though most of these have been

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This dissertation follows the style of *Design Studies.*

on an ad hoc basis and few as a formal part of the overall curriculum (Bronet et al. 2003; Cannon 2001).

The goal of this study is to survey leaders, innovators, and visionaries in architectural education about collaborative methodologies being utilized in the design studio; to identify factors that inhibit and facilitate the incorporation of collaborative methods; and to provide a methodology for the institutionalization of a collaborative design studio.

1.1 Background of the Study

In 1993 the five organizations representing the architectural profession, The American institute of Architects (AIA), The American institute of Architecture Students (AIAS), National Architectural Accrediting Board (NAAB), National Council of Architectural Registration Boards (NCARB), and the Association of Collegiate Schools of Architecture (ACSA) commissioned the Carnegie Foundation under the direction of the late Ernest Boyer to undertake a comprehensive study of the architectural practice and education. This study was preceded by at least half a dozen other comprehensive studies spanning a period of more than sixty years, each addressing important topics, but none having the unilateral support of the Boyer study. Over a thirty month period the scholars of the Carnegie Foundation spent untold hours interviewing architects, educators and students, analyzing data and compiling the report entitled *Building Communities: a New Future for Architecture Education and Practice*. The core of the report is found in their seven essential goals for renewal: an enriched mission, diversity with dignity, standards without standardization, a connected curriculum, a climate for learning, a unified profession, and service to the nation. The underlying theme to each of these "essential goals" is the call for greater collaboration in one form or another and is addressed well in the following quote by Allan R. Cooper.

> Students can no longer afford to work in sublime isolation from others, nor can faculty continue to ignore the essential interdisciplinary nature of architectural decision making. (Boyer and Mitgang 1996, pp. 85)

1.2   Statement of the Problem

Historically, the education of an architect has been a highly individualized pursuit, focused on the development of an individual skill-set (Boyer and Mitgang 1996) that seldom required collaboration beyond that of student and professor.   While this individualized, hands on approach to education has been highly revered by many (Cossentino 2002; Shaffer 2003; Kuhn 2001) it often falls short of its potential and fails to recognize that the greatest design accomplishments of humankind have been the undertaking of collaborative enterprise (Bennis and Biederman 1997). Furthermore, architecture students are being prepared in a manner that is contrary to the highly collaborative nature of the architectural practice they will enter (Crosbie 1995) Raising the question – can collaborative techniques be addressed in the design studio without taking away from the inherent strengths of the traditional studio based architectural education?

1.3   Purpose of the Study

The purpose of this study was to survey collaborative methodologies being utilized in the design studio; identify factors that inhibit and facilitate the incorporation of collaborative methods and provide a methodology for the institutionalization of a collaborative design studio.

1.4   Significance of the Study

This study sought to look beyond the highly individualized teaching methodologies traditionally associated with the architectural design studio by examining alternative methods that focus on collaborative techniques of teaching and learning. This research

utilized a series of ethnographic interviews conducted with authorities in architectural education and focused on the use of the design studio as a vehicle for teambuilding and leadership development.

1.5   Contribution to the Field

The intent of this research to was to provide a deeper understanding of the role that collaborative methodologies are currently playing in design pedagogy; to contribute to the body of knowledge on this subject within the discipline of architecture by identifying the factors in design curricula that encourage and discourage a collaborative discourse; and to provide a "snapshot" of where design pedagogy stands relative to other disciplines in the development and application of collaborative methodologies in the classroom and more specifically in the design studio.

1.6   Extent of the Study

As Part of this dissertation, the following limitations were in place throughout the course of this study:

1. Tenured and non-tenured educators, administrators and clearly associated research professionals were invited to participate in the study.
2. Only educators and administrators at ACSA accredited schools of architecture were invited to participate in the study.
3. A limited number of associated research professionals outside of ACSA accredited institutions were invited to participate in the study.
4. Interviews of the participants followed an interview guide (Appendix C) but remained flexible to allow for the discovery of new and/or additional information.

1.7   Organization of the Study

This study sought to address this issues stated above and is structured in a five section format inclusive of this introduction. Section two, the review of literature, covers five areas including situated learning theory, the collaborative curriculum, group creativity, collaboration and the professions, and collaboration in the design studio. Section three, methodology, addresses the choice of qualitative research as the appropriate paradigm for this study and the methods collection and analysis employed in the course of this study. Section four documents the findings of this study and Section five summarizes these findings, suggests conclusions and provides implications for further research.

2   REVIEW OF RELEVANT LITERATURE

2.1   Introduction

Collaborative enterprise has found increasing popularity in recent years, permeating most facets of daily life, ranging from the playground to the research laboratory (Schuman 2006). In professional education the use of collaborative methodologies has steadily increased over recent decades to the point of institutionalization in the disciplines of engineering, nursing, law and medicine (Alpay and Littleton 2001; Burbank et al. 2002; Fromm 2003; Seaburn et al. 1996; Weinstein 1999). Opening the question of why architecture, a discipline so heavily dependent on collaboration in the daily practice of its craft (Crosbie 1995), would not actively seek to prepare its future practitioners with fundamental collaborative skills? This question led to a review of the literature to uncover research of past and present on the design studio and collaborative pedagogies. This literature is focused on four principle areas: architectural education; collaborative pedagogy; collaboration in professional education; and collaboration in the design studio.

2.2   Architectural Education

The profession of architecture has long embraced a model of apprenticeship dating back to fifteenth century Italy under the tutelage of Flippo Brunelleschi and his contemporaries, a model that stood largely unchanged until the middle part of the nineteenth century (Fisher 2004). Specialized schools of architecture did exist, such as the Ecole des Beaux Arts, in Paris which was founded in 1651. But they trained a very small percentage of the architects practicing at that time with most favoring the apprenticeship model. A key factor in the transition away from apprenticeship to formalized professional schools was the Morrill Act of 1865 establishing state land-grant universities. The first

schools of architecture where established at MIT 1867 (Not a land-grant university), Cornell 1871 and the University of Illinois in 1873 (Bannister 1954). Many of these early programs were fashioned after the curriculum of the Ecole des Beaux Arts and established the studio model of education with a design master or tutor (instructor) and the design apprentice or student; the model that continues to flourish today.

2.2.1 Scope of professional education

The current system of architectural education in the United States (see Figure 2.1) divides the classic apprenticeship into three distinct parts culminating in licensure as a professional architect: professional education; professional internship; and registration examination.

The professional education of an architect is conducted at the university level and can be found in one of three general variants: an undergraduate professional degree (five years required); professional master's degree (two – three years required depending on the type of undergraduate held by the student); and professional doctorial degree (eight years required). Each variant is subject to accreditation by the National Architectural

Figure 2.1
Professional Licensure as an Architect

Accrediting Board (NAAB) based on a series of thirty-four performance and assessment criteria as listed in Appendix E. There are currently one-hundred and sixteen accredited programs in North America (outlined in Appendix G).

Professional education is followed by a professional internship under the direction of a licensed architect as defined by the National Council of Architectural Registration Boards (NCARB) (NCARB 2007) the organization responsible for administering the internship process. NCARB has established a training system that requires the intern architect to attain fifty-six hundred hours of practical experience across sixteen areas of concentration as illustrated in Appendix F. As the intern completes the requisite number of units in each category they will submit a written affidavit signed by the intern and the mentoring architect to NCARB. When the intern architect has successfully completed the seven hundred units (a unit represents eight hours of actual work) of the internship and at the
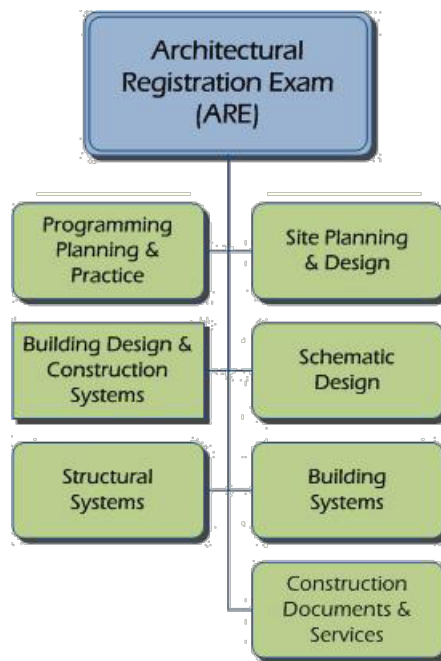
Figure 2.2
ARE v4.0

request of the intern, the intern's record will be verified and forwarded to the state licensing board where the intern is seeking initial registration.

The final stage of licensure for the intern architect is the completion of the architectural registration exam (ARE). The ARE is a comprehensive seven part exam (see figure 2.2) that tests the intern on skills and knowledge attained through university training and the internship process. The average time period required to take and pass the architectural exam is twenty-eight months (NCARB 2007). Upon satisfactory completion of the ARE the intern is granted the title of architect and the rights and responsibilities that go along with it by the state under which the application for licensure was made.

It is important to note that these agencies, particularly NCARB, are given their power of regulation by the individual states as a method of enabling interstate reciprocity of professional licensure. This reciprocity allows an architect located in one state to practice in another since all architectural licenses are granted by the individual state.

2.2.2   The design studio

The formal education of an architect has long represented a unique pedagogy. When the training of architects was shifted from the office— a project based apprenticeship model— to the university over 140 years ago (Fisher 2004), the first example of institutionalized project based learning (PBL) was established in the form of the design studio (Bannister 1954). A model later embraced by John Dewey, Donald Schön and others across the academe (Kuhn 2001; Waks 1999; Shaffer 2003).

The design studio traditionally involves small classes that are focused on a single, open ended, project based problem, that each student resolves in their own way (Schön 1985), and then judged and reviewed collectively by a design jury. This approach educates

students in a *situated learning* (SL) environment; one that emulates the working environment students will find as they enter into professional practice. In the case of architectural education, the design studio environment closely approximates the manner in which architectural projects are conceived, investigated, and realized. The Design Studio is focused on the "how" of architectural education by giving the design student hands on experience in tactile application of the design process (Salama 1995). In this context the design studio affords the students what Lave calls an *authentic learning* experience (1991) by teaching students the craft of architectural design in a manner closely associated with the way that it is practiced in the professional world.

Often the design problem is intended to incorporate numerous issues that must be resolved in order to "solve" the problem. It is commonly acknowledged that there is seldom (if ever) a single solution to a design problem. It is frequently demonstrated that students in the design studio will have their own unique solution when resolving the problem. Other unique features of the design studio include the length of studio classes, the duration of design projects, the depth or complexity of the projects or problems. Design classes typically have duration of three to four hours and meet from two to four times per week based on the course level. The typical design project will range in duration from a few weeks to an entire semester for a single project. Unlike other disciplines like physics, history or math this is no definitive correct solution to a design problem. To any design problem there could be dozens of possible solutions that satisfactorily address the design problem being solved (Peña and Parshall 2001), though some are likely better than others.

In the typical architectural design curriculum, the design studio occupies more than fifty percent of the course load (Salama 1995) taken by the design student. Historically, in a typical academic year there are more than two-thousand design studios being taught at

the one-hundred and sixteen accredited institutions in the United States. Each of these, taught in their own way at varying degrees of complexity, though a vast majority will address the same core elements through the creation of an artifact that satisfies an identified design problem (Cuff 1991).

2.2.3   Structure of the design studio

> It is argued that the development of an appropriate project vehicle to stimulate enquiry, impart knowledge, teach skills and develop critical values is the key to successful studio teaching. In any educational process which aims to fit students for professional practice a layered, multivalent problem type with familiar and accessible foothills, challenging mid-slopes and distant if near-unattainable peaks is essential. (Skinner 2000, pp. 1)
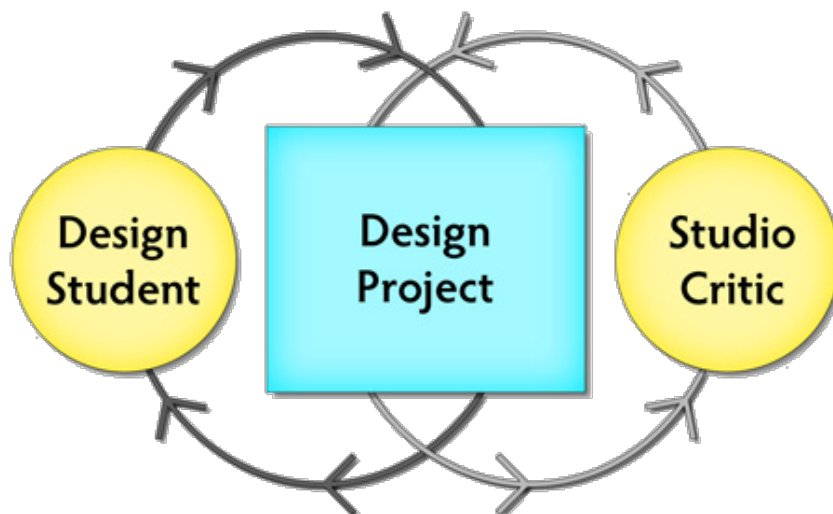
Figure 2.3
Design Studio Workflow 1

An element that stands out in the way architects are educated is the student-centered approach of the design studio. The nature of the studio has historically been highly individualized with large amounts of personal interaction between student and professor, (see Figure 2.3) through a process of review and critique (Wendler and Rogers 1995). The studio class tends to be very small in size, typically fifteen or fewer students. As a result, the amount of contact time that each student has with the professor is very high when compared with other courses in other departments across the university.

2.2.3.1   The project description

The project description is a concise explanation of the design project outlining specific requirements that must be addressed in the course of the assignment. The project statement focuses on the functional requirements of the proposed architectural design and any required background information (Jones 1992). The initial objective of the project description is to establish the intended use and occupants of the proposed project.
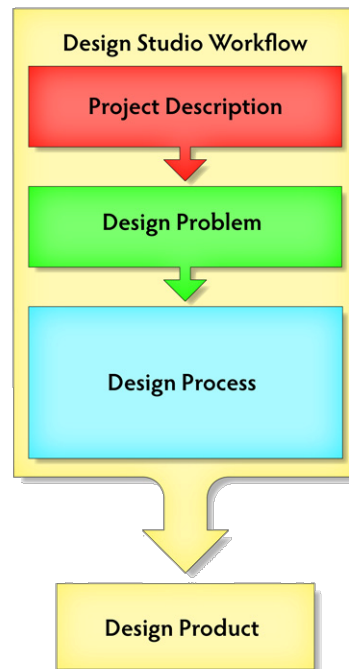
Figure 2.4
Design Studio Workflow 2

The project description will also include any appropriate contextual information that may be required to complete the project. Applicable historical information, the physical location of the site, climatic conditions, site boundaries, and other pertinent background information are a few examples. It is also likely to include specific information on building code requirements, spatial requirements (sq. ft. allotments), and spatial relationships (adjacencies) (Lawson 2006).

The project description will also outline the output that the design student is required to generate for satisfactory completion of the design project, such as a list of the desired drawings (i.e. plans, sections and elevations), sketches, and physical or digital models.

See Appendix H for a sample Project Description.

2.2.3.2 The design problem

> Sometimes I think we arrive at a solution before we know what the problem is. We say 'my next design will be round!,' without logic or analysis. (Peña and Parshall 2001, pp. 19)

The project description given to the student at the beginning of a design project contains a spectrum of information about the design project to be completed. In the lower level studios this document may also contain the design problem to be addressed. In upper level undergraduate and graduate studios it is often left to the design students to identify the problem to be solved. The process of problem identification, more commonly referred to as programming in architectural design, requires the student to sift through the layers of information found in the project description to identify the principal and subordinate issues to be addressed in the design project (see Figure 2.4). The design problem can be described as the discrepancy between desired and existing conditions (see figure 2.5). The role of the designer is to bridge this gap or discrepancy in effort to offer a seamless transition between the desired and existing condition with the best solutions being the ones that leave no indication that there was a discrepancy at all. When seeking to identify the problem it important to note that some problems will be readily identifiable; others will be "fuzzy" requiring additional effort to define (Draze and Palouda 2005).

There are numerous strategies by which this process can be completed, but the product of this effort remains the same, a written statement outlining the general design directive for the project called a problem statement. The proceeding paragraphs will highlight two methods used in the development of a problem statement.
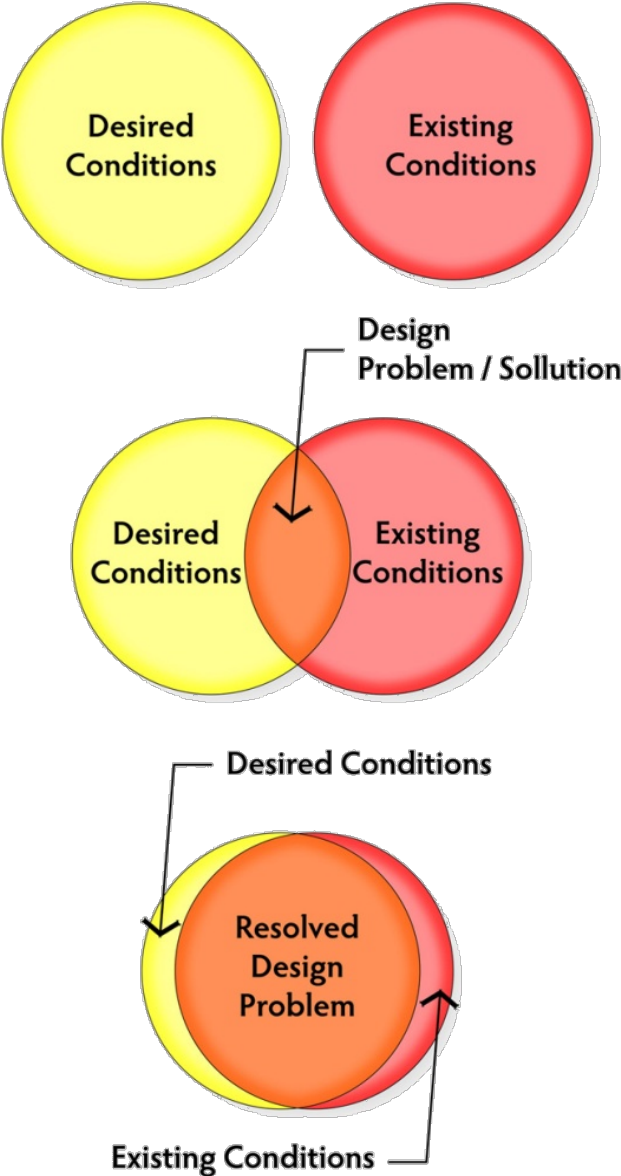
Figure 2.5
The Design Problem

The process of programming is the analysis phase of the design project, where the designer seeks to address five principal concerns: Establish goals; Collect and analyze facts; Uncover and test concepts; Determine needs; and State the Problem (Peña and Parshall 2001). There are a variety of processes used to achieve this series of tasks resulting in the problem statement. Peña utilizes a system that requires the designer to document key ideas during brainstorming sessions onto a group of blank analysis cards utilizing a combination of text and graphics. Once documented the cards can be pinned up, move and grouped as required to allow the designer to winnow out the critical data required to develop a problem statement that clearly identifies the problem(s) to be solved and the manner in which they will be addressed.
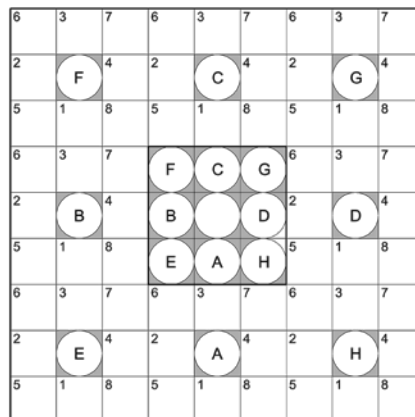
Figure 2.6
Lotus Blossom Worksheet 1
(From Michalko, pp. 133)
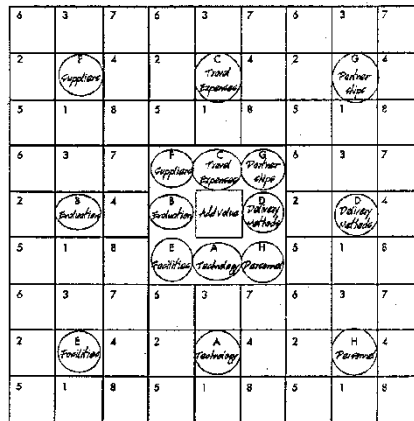
Figure 2.7
Lotus Blossom Worksheet 2
(From Michalko, pp. 134)

Another method of achieving this task is through the use of a nine square grid, also referred to in Thinkertoys as a *Lotus Blossom* (Michalko 2006). In a process similar to Peña's analysis card technique, the designer identifies the most "significant components or themes" in the project and documents those in the innermost square of the lotus blossom worksheet (letters a-h on figure 2.6). The corresponding themes or components are then carried to their corresponding circles in the outlying squares where the related subtopics are identified (see Figure 2.7). The information identified through the lotus blossom serves as the outline in identifying the design problem to be addressed and writing the problem statement. Peña describes the problem statement as the "critical conditions and design premises that become the starting point for schematic design" (2001, pg. 134). For design studio project of moderate complexity it may be possible to accomplish this with a single lotus blossom worksheet, for the more complex it is likely to take several. Each of the methods described help the designer to identify these critical conditions as the design process moves forward.

2.2.3.3   The design process

> Always design a thing by considering it in its next larger context -- a chair in a room, a room in a house, a house in an environment, an environment in a city plan. (Saarinen 1956)

The process of design is an orbitual progression encompassing three essential components: analysis, synthesis, and evaluation (Lawson 2006). This process cycles with continued refinement of the design as illustrated in Figure 2.8. This iterative process will continue until the problem defined in the problem statement has been adequately addressed.

The design process begins with *analysis*, an undertaking Lawson describes as the "exploration of relationships, looking for patterns in the information available, and the classification of objectives"(pg. 37). Analysis entails a critical examination of the various
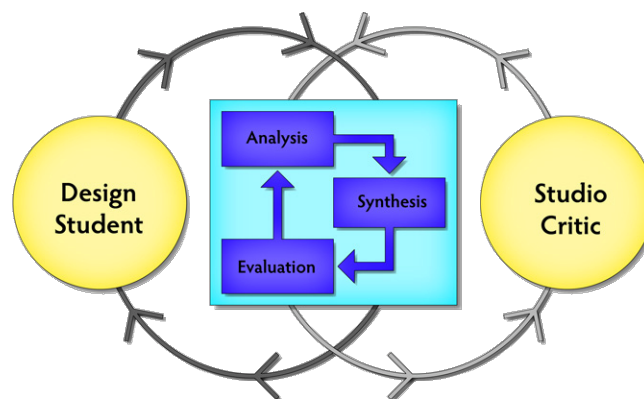
Figure 2.8
The Design Process

factors concerning the design project being pursued. For example, in the design of a "green" housing development, possible considerations might include: maximizing energy efficiency; the use of natural systems for lighting, energy production and ventilation; the incorporation of grey water systems; and the use of higher quality regional materials

reducing the cost of transportation and increasing the overall life of the structures. For the design student this begins with the development of the problem statement as outlined above and continues as a reflective action in the continued refinement of the design.

The analysis stage gives way to that of *synthesis* where the designer begins to apply the ideas and concepts outlined in the analysis phase. This part of the process is characterized by Lawson as the "attempt to move forward and create a response to the problem – the generation of solutions" (pg. 37) The process of synthesis can emerge as a complete idea or fragments of a solution that through further iteration will be refined into a cogent solution or course of action. In the case of the example used above of the "green" housing development the designer may take the concept of "natural systems for lighting" and use that for the basis of developing a day lighting system that uses sunlight as the primary means of lighting the residence and as the basic foundation on which the project is constructed.

After the designer's ideas have been synthesized they must be *evaluated*. This stage entails the critical evaluation of solutions developed in the process of the synthesis phase against the objectives identified in the analysis phase allowing the designer to determine if the design problem is being adequately addressed. Continuing to build on the example above the designer of the "green" housing project may choose to alter the initial concepts for the residential design unit due to inadequate lighting in rooms on the eastern exposure of the building and excessive thermal gain on the western exposure. The process of evaluation is the designer's opportunity to critically evaluate the decision made in the previous two stages of the design process. James Levin makes this point in a slightly different way: "Follow effective action with quiet reflection. From the quiet reflection will come even more effective action." This process of reflection allows the

design student to refocus on the big picture again, seeing elements that may have been lost when more keenly focused on the finer details of the design problem.

The process of evaluation is not limited to that of just the designer; the studio critic (design professor) will also take an active role in this stage of the process by offering critiques of the design throughout the process as diagrammed in Figure 2.9 and described further in the next section of this document.

At the conclusion of the evaluation phase of the design process either a new cycle will begin or the design process concludes with a finalized design to be critiqued in a formal way. If a new cycle of development begins there will be the continued *refinement* of ideas, drawings and models that will occur. In the case of the "green" housing project, in subsequent stages of the design process, the designer may choose to take the day lighting techniques further by incorporating both passive and active solar techniques to address issues of heating, cooling, and energy production, each building on the initial ideas of the use of the sun as a natural means of providing light in the structure. Obviously this example highlights only one of the many thousands of considerations the designer must address.

2.2.3.4   The design crit

> …wise architectural criticism seldom suggests a solution, it suggests only a road, or perhaps several roads, by which a solution may be reached… The great critic never teaches architecture, he only suggest a method by which the problems of architecture may be attacked. (Bosworth, Jones, Architecture and Carnegie Corporation of New 1932, pp. 56, 184)

The design critique, commonly referred to as a crit, is the opportunity for the student to get feedback on their design project. In the course of a design studio the student is likely to be exposed to one or more types of critique, the desk crit, the peer crit, and the design jury. Each of these formats offers the student a different type of feedback

intended to assist the student in advancing their project and their overall development as a designer.

Of the three critique formats the desk crit is the most private (Anthony 1991). This format offers a one-on-one exchange between the design student and the instructor in a
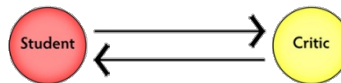
Figure 2.9
The One-on-one Dyadic Review

format that could best be described as a "process review". There are variety methods of conducting a desk crit, but Anthony groups them into two general categories (1991, pp. 116): visual techniques such as drawing and diagramming; and verbal techniques described by Schön as reflection-in-action (Schön 1987). Anthony notes that the visual technique of critique may occur with very little verbal exchange between student and instructor. In this scenario the instructor will sketch ideas with the student based on work completed since the previous session. These sketch ideas may continue to focus the student in their current direction or they may serve to point the student towards an alternative path. A benefit to this sort of exchange is that the student is left with artifacts (sketches) of the discussion that can assist the student after the critique in developing their project further. It also exposes the student to a communication technique that is often used between the practicing architect and their client.

The second approach discussed by Anthony is a verbal dialogue between the instructor and the student. In this setting the design instructor and student actively engage in discussing the project, the underlying ideas, the overall development, and potential

directions the project might follow as it continues to develop. The student is asked to look at the design decisions made up to this point and the impact that those decisions have had on the overall design. In the context of the design practitioner the Schön refers to this process in the following way:

> The practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings which have been implicit in his behavior. He carries out an experiment which serves to generate both a new understanding of the phenomenon and a change in the situation. (Schön 1983, pp.68)

This introspective approach to design encourages the student to gain a more thorough understanding of decision made in the design process. In the milieu of the design crit, the instructor and student undertake this journey together exploring the design decisions made and the affect they have had on the overall design product. This desk crit process often occurs several times during the course of a design project with each critique considering the progression and developments achieved towards an established goal since the last desk crit (Wendler and Rogers 1995).

The next form of critique described by Anthony is the peer crit. This, in most formats, is a less private method of critique and can be conducted in a variety of configurations, though the most common are one-on-one peer critique (Figure 2.9) , small peer group critique (Figure 2.10) and the large peer group critique (Figure 2.11). The one-on-one peer critique is very similar in format to the desk crit without the inherent hierarchy associated with the student / faculty relationship. Like the desk crit the one-on-one peer crit is even less formal lending itself to discussion based engagement. The peer critic is keenly aware of the nuances associated with the particular design problem since they are also engaged in the problem themselves allowing them to offer an insider's perspective

to the design problem being addressed. This approach also serves to help the student to

develop mentoring and leadership skills that will be useful throughout their careers.

The small peer group critique is a more structured critique process that involves utilizing
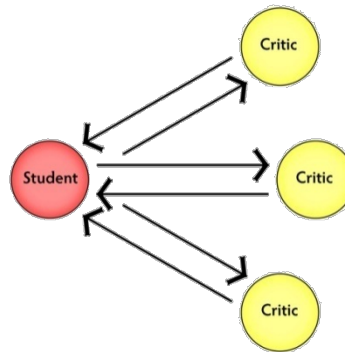
Figure 2.10
The Small Group Didactic Review

two to three design students as peer critics. In this scenario the peer reviewers seek to

serve as advisors to their classmates by helping to assess the progress and offer guidance

on project development. This format offers the same benefits as those embodied in the

one-on-one peer critique (such as an insider's perspective) with the added advantage of

the additional points of from the multiple critics and the ability to analyze the work at

greater depth (Walvoord and Anderson 1998). In addition, this format mitigates the

need for a single student reviewer to shoulder the entire burden of providing a

thoughtful constructive review, which can be difficult for students, by spreading the

responsibility between multiple students. It has also been established that by working

collaboratively the quality of the feedback that the students receive can be increased

(Bransford, Brown and Cocking 1999). The intimate nature of this small group format

allows for a sustained dialogue between the student being reviewed and the peer critics.

The role of the studio instructor in this format will often be limited to that of moderator

(when necessary) between the student being reviewed and the students offering the critique. An additional variant on the peer review methodology is the large group format. As with the one-on-one and small group format this continues to be a process review and not a final evaluation. The large peer group critique is an open forum format critique that involves a significant proportion (if not all) of the participants of the design studio with the typical studio class ranging from ten to eighteen students. In the case of the large review format, the dialogue that is central to the one-on-one and small group reviews does change in the context of the large group format. In this format the student being reviewed will present the project to the peer group. Then the student being reviewed will open the floor to questions or comments. The student critic may choose to make comments or observations about the work presented or they may choose to engage the student being reviewed in a dialogue about specific aspects of the project.   This dialogue will be very similar to that found in the other formats and will serve as a launching point for other peer critics in the group to enter into the dialogue. At the point where this dialogue begins in the review process, the critique becomes very fluid and is often rich with opportunity for enrichment and reflection on the part of all students involved.

As the design project concludes the method of critique shifts from one of process review to one of final review. Any of the aforementioned formats can be implemented as a
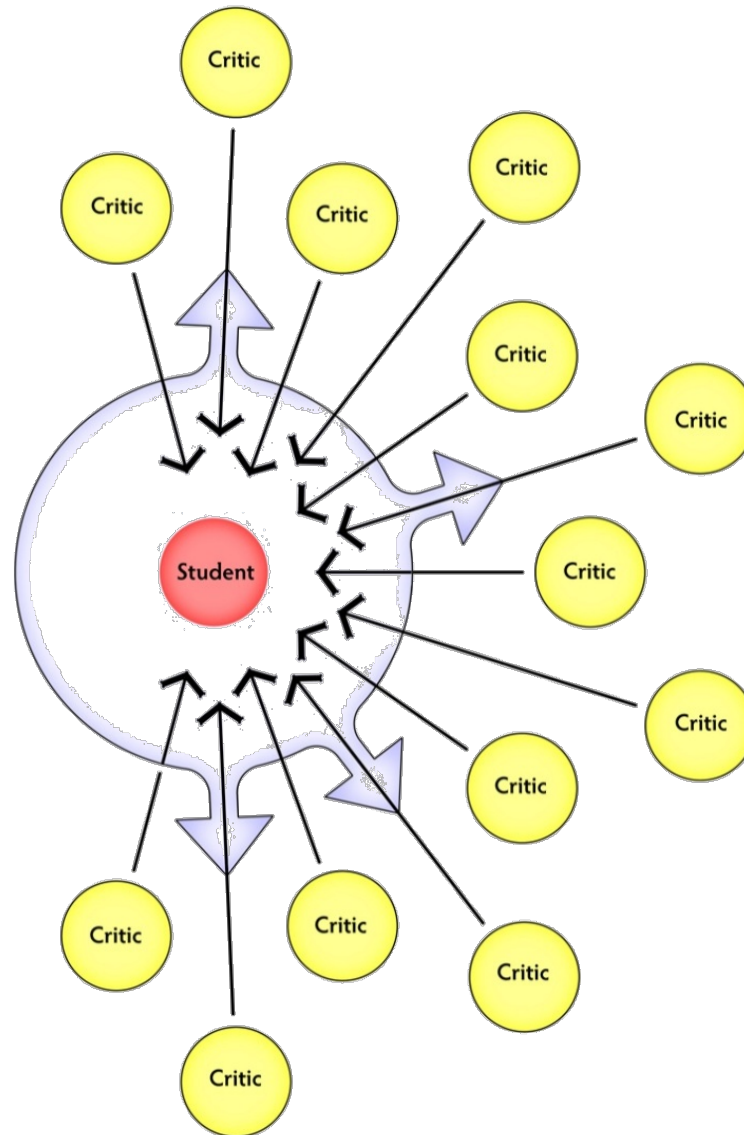
Figure 2.11
The Group Didactic Review

mechanism for final review. However, the most common method of final review in the architectural design studio is the architectural design jury. The design jury is an open format critique that unlike the desk crit or peer review models is a post-process or final review conducted at the conclusion of a studio project. The design jury is conducted in a format similar to the large group peer review described above. In a jury review, the student being reviewed will present their project to the design jury, the studio instructor, their classmates and any passersby (see figure 2.12). The makeup of the design jury will vary from project to project but typically includes design faculty members and visiting critics (experts) on the project typology being presented. The method of presentation and critique is the same as the large format peer review and will include a formal presentation form the student followed by criticism in the form of comments and dialogue from the jury. It is not uncommon for students from the class, studio instructors and passersby to also contribute to the dialogue.

> The jury system nevertheless survives because it achieves results that would be otherwise impossible to obtain: it simulates to some extent the reality of making presentations in practice; it reinforces the importance of meeting deadlines; it provides a forum for students to see each other's work and for faculty to see the work of students other than their own; it encourages graphic quality; and through jury discussion, it raises important issues and promotes new thinking. Like it or not, the architectural jury is probably here to stay and represents one of the unique, recurring experiences in architectural education (Lewis 1985, pp. 77)
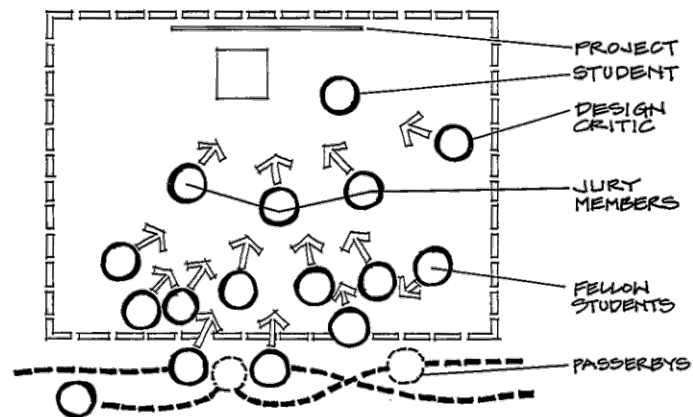
Figure 2.12
Design Jury Organization
(From Anthony 1991, pp. 3)

Over the past two decades the jury review system has been the subject of much debate. The fluid nature of the critique and a tendency to focus on the negative elements of the project being reviewed, does cause concern, however, this system is unlikely to change in the foreseeable future and an important role in the education of design professionals.

2.2.4   The design studio… problem based or project based learning

> Project-based learning is... focused on teaching by engaging students in investigation. Within this framework, students pursue solutions to nontrivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artifacts… (Blumenfeld et al. 1991, pp. 371)

In the mid 1980's Donald Schön brought great attention to the architectural design studio in his book *The design studio: an exploration of its traditions and potentials* (1985). In this work Schön focuses on the strength of design studio as a method of teaching where Project-Based Learning is used as a means of developing deeper

understanding through a repeated process of active engagement, followed by critical reflection on the tasks that were performed. Schön spent a majority of his career focused on considering ways in which the Project-Based approach found in the design studio and the reflective nature of its application could be reapplied to other disciplines. Over recent decades, Schön's work has gained great popularity in a spectrum of disciplines including education, medicine, law, engineering and the physical and life sciences as a model for teaching (Barron et al. 1998; Brandon and Majumdar 1997; Speck 2003; Waks 1997; Schön 1985). Disciplines that traditionally utilized a teacher-centric model of learning that continue to be found in the classrooms of nearly every university across the globe. Direct instruction is the predominant instructional practice used in the teacher-centered approach (Brown 2003) and this approach places the professor as the central point of knowledge and its dissemination. This model limits the degree of bilateral interaction in the classroom and places the instructor in the sole position of power (authority). There are courses where this is the preferred methodology and where rote learning is the objective and in these settings it can be highly effective. Under the teacher-centric model classes can be very large (easily accommodating hundreds of students) and the material disseminated can be reused with similar result from class to class and semester to semester.

In contrast to the teacher-centric approach Schön emphasized the inherent strengths of the student-centric approach that he found in the architectural design studio. There are many forms of student-centric learning; the most familiar to the architectural community and that discussed by Schön is Project-Based Learning model. This model of formalized Project-Based Learning (PBL) is one of the oldest educational models in existence and serves as the core of architectural education. For architectural education, the studio is the point where students are afforded the opportunity to get their hands dirty and learn through doing a process of doing. The student-centric model requires that the position

of power (authority) be shared between student and faculty member allowing for a bilateral exchange between student and instructor allowing for more meaningful learning to occur. Studies have concluded that when student are given the opportunity to self-direct and learn through doing that the quality of learning is higher and the retention is substantially longer when compared with the teacher-centric models (Hake 1998). Bernhard's findings were similar as she notes in following:

> …learning which is "meaningful" leads to substantive incorporation of new knowledge into cognitive structure. "Rote" learning on the other hand leads to a non-substantive incorporation of new knowledge. Other discuss learning in terms of "deep" versus "surface" approaches or, as mentioned above, in terms of "active engagement" versus "passive reception" instruction. Thus learning and teaching which uses instructional approaches that encourage meaningful learning, deep approaches to learning or active engagement… (Bernhard 2000)

A review of the literature on design studio pedagogy revealed that the terms "Problem-Based Learning" and "Project-Based Learning" are often used interchangeably in the context of the design studio. Raising the question, are they the same thing? The education literature says no, making a distinction between Problem-Based Learning and Project-Based Learning, while noting the significant overlap that exists between the two (see figure 2.13). The distinction between the two is focused on the key areas of process and the resultant product. In the case of Problem-Based the underlying driving force is the defined problem (Glazer 2001). Glazer describes Problem-Based inquiry as

> …emphasizes learning as a process that involves problem solving and critical thinking in situated contexts. It provides opportunities to address broader learning goals that focus on preparing students … Students gain experience in tackling realistic problems, and emphasis is placed on using communication, cooperation, and resources to formulate ideas and develop reasoning skills.
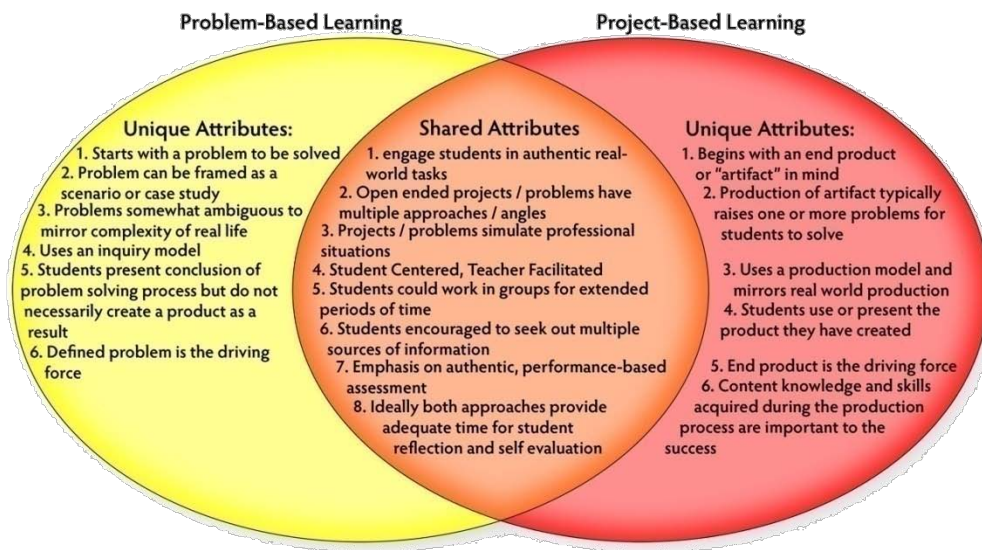
Figure 2.13
Problem / Project Based Learning
(From Osteen 2005)

In addressing a defined problem, the student does not necessarily seek to create a product or artifact, but rather, present the conclusion of a problem solving process where the emphasis is implicitly placed on the *process of problem solving* rather than the resultant product (Esch 1998). Each describes Project-Based inquiry as focused on the creation of an artifact derived from a design process. While the process is still important, the goal of this form of inquiry is to produce a tangible product. In the case of a design studio this product might include technical drawings, renderings, models or multimedia presentation. Both forms of inquiry share theoretical frameworks that most often include situated cognition, constructivism, social learning, and communities of practice.

2.2.5   Design studio and contemporary educational theory

> Students of any age who are novices need a period of exploration and a phase of apprenticeship before they can enter more formal learning environments that deal with disjunction's among ways of knowing (Gardner 1991, pg. 204)

In seeking to identify educational theories related to the manner in which architects are educated and the desire to focus on a collaborative model of engagement several emerged as potential candidates: Vygotsky's Social Development Theory, Lave's Situated Learning Theory & Bandura's Social Learning Theory. Of these three, Situated Learning Theory correlates most closely with the form of collaborative pedagogy being investigated.

Situated Learning Theory, developed by Lave and Wenger in 1991, asserts that learners participate in a "community of practice that embodies certain beliefs or behaviors to be acquired" (Kearsley 2007). Lave and Wenger don't seek to understand the cognitive processes or conceptual structures involved in the process of learning, choosing to focus on the types of social engagement that allow for an appropriate learning environment. Situated learning is built upon four key assumptions or premises (Anderson, Simon and Reder 1996; Wilson 1993): 1. Learning is grounded in the actions of everyday situations; 2. Knowledge is acquired situationally and transfers only to similar situations; 3. Learning is the result of a social process encompassing ways of thinking, perceiving, problem solving, and interacting in addition to declarative and procedural knowledge; 4. Learning is not separated from the world of action but exists in robust, complex, social environments made up of actors, actions, and situations (Stein 1998).

It is Lave's (1991) position that learning is embedded within the activity, context and culture of the social engagement. For situated learning to occur knowledge is attained through the process of performing tasks in an authentic context and NOT through the acquisition and reapplication of a discrete body of abstract knowledge. Stein states it in the following way:

> …to situate learning means to create the conditions in which participants will experience the complexity and ambiguity of learning in the real world.

> Participants will create their own knowledge out of the raw materials of experience, i.e., the relationships with other participants, the activities, the environmental cues, and the social organization that the community develops and maintains. (1998, pp. 1)

This represents a belief embodied in the way that architects are trained both today and in generations past, in which the design studio professor (design instructor) assigns the design project (problem) to the students and through the process of social engagement between the professor, the design student and student peers, leads to a design solution. The process of developing the design solution could span a period of days, weeks, months or more.

In further examining situated learning, there are four central components or elements: content, context, community of practice and participation.

The foundation of situated cognition is the *content* of the situated learning experience. Content refers specifically the facts and the processes associated with those facts. The immersive nature of situated learning requires that the learner has a command of the underlying facts of the task at hand. Situated learning does not require the learner to retain these facts, but rather, have a working knowledge of the facts, an understanding of the application of the facts, and the potential ramifications associated with the facts. In the framework of the design studio, content includes the specific tasks (design problem) associated with the course objective as well as the knowledge situated in the learners daily experiences (Shor 1996). The measure of a successful situated learning experience is gauged by its application rather than the retention of discrete information (Stein 1998).

> Learning is not separated from the world of action but exists in robust, complex, social environments made up of actors, actions, and situations. (Stein 1998)

The next primary component is context, referring specifically to the environment in which learning takes place and includes both the tangible and intangible. This environment needs to be sensitive to the task or process undertaken by the learner and allows the student to learn through by doing in a manner that emulates the world of professional practice. The design studio is such an environment where the similarities between academy and practice are striking. Stein states that the context must also "embrace notions of power relationships, politics, competing priorities, and the learner's interaction with the values, norms, culture, of a community, organization, or family". Wilson points out that it is important to understand that context is not simply bringing life's experiences into the classroom, but rather, incorporating the multiple perspectives of the classes participants and allowing those perspectives to influence the overall outcome of the tasks being undertaken while permitting learners the opportunity to partake in the experience (Wilson 1993). Stein notes that "…context provides the setting for examining experience; community provides the shaping of the learning."(Stein 1998)

> Learning is the result of a social process encompassing ways of thinking, perceiving, problem solving and interacting in addition the declarative and procedural knowledge. (Stein 1998)

Community is the vehicle for learning in situated cognition. It is through a community of practice that students interpret, reflect and form meaning (Lave and Wenger 1991). Within all design studios there is an underlying dialogue that exits in the form of critique or free exchange (Boyer and Mitgang 1996). It is this dialogue that allows the learner to see a diverse range of viewpoints, approaches, and methods of application. It is the social interaction that enables, encourages and evokes this exchange that defines a community of practice (Brown 1994; Lave and Wenger 1991). Stein concludes his discussion on communities of practice by stating "Community provides the opportunity for the

interaction; participation provides the learner with the meaning of the experience." (1998)

> learning is a process of participation in communities of practice, participation that is at first legitimately peripheral but that increases gradually in engagement and complexity (Lave and Wenger 1991)

Situated cognition is dependent on participation, an interaction between learners, peers and instructor to develop the dialogue needed to enable the learning experience. Participation, in the context of situated cognition, includes the exchange and interchange of ideas between learners as well as the active engagement with one another in the pursuit of the curricular objectives. In the case of the design studio, curricular objectives are addressed through the solving of a design problem and the development of the appropriate artifacts (i.e. drawings, models, etc,). The learning that comes from the active engagement of learners is usually unintentional rather than deliberate. These ideas are what Lave & Wenger (1991) call the process of "legitimate peripheral participation". Learning occurs in a social setting through dialogue with others in the community (Lave 1988). Stein notes that "Learning becomes a process of reflecting, interpreting, and negotiating meaning among the participants of a community. Learning is the sharing of the narratives produced by a group of learners." (Stein 1998)

2.3   Collaborative Pedagogy

> Collaborative learning occurs when students and faculty work together to create knowledge… It's a pedagogy that has at its center the assumption that people make meaning together and that the process enriches and enlarges them. (Mathews 1996, pp. 101)

In recent years "collaboration" has become a popular buzzword that is frequently used interchangeably with other terms such as cooperation, coordination, teamwork, and other group activities. For the purpose of this study it is important to understand what is

meant by collaboration and how it differs from these other concepts. Collaboration, cooperation, coordination and teamwork each represent multiple parties engaged in a common task working toward common goals, but the similarity stops there. This study will use definitions developed by Mattessich in *Collaboration: what makes it work (2001)*:

> COOPERATION – "…characterized by informal relationships that exist without any commonly defined mission, structure, or planning effort. Information is shared as needed, and authority is retained by each organization so there is virtually no risk. Resources are separate as are rewards."(pp. 60)
>
> COORDINATION – "…characterized by more formal relationships and an understanding of compatible missions. Some planning and division of roles are required, and communication channels are established. Authority still rests with the individual organizations, but there is some increased risk to all participants. Resources are available to all participants and rewards are mutually acknowledged." (pp. 60)
>
> COLLABORATION – "…brings previously separated organizations into a new structure with full commitment to a common mission. Such relationships require comprehensive planning and well defined communication channels operating on many levels. Authority is determined by the collaborative structure. Risk is much greater because each member of the collaboration contributes its own resources and reputation. Resources are pooled or jointly secured and the products are shared." (pp. 60)

All are examples of teamwork with the key difference being the degree to which vested interest in the overall outcome is collectively shared by the various stakeholders participating in the team or group.

The first, intradisciplinary, is a collaborative model where students are brought together from the same discipline (and same general skill set) to collectively address a design problem in a collaborative way.

The second category is interdisciplinary collaboration. In this model, students are brought together from different disciplines because of their unique "disciplinary skills" to solve problems of greater breadth and depth than can be addressed in a more singularly oriented disciplinary course of study. This idea of collaborative learning builds upon the idea that the design and construction of buildings is a multifaceted complex problem undertaken by an interdisciplinary team, rather than a single individual (Fromm 2003, 2002; Howard 1997).

Using these definitions to understand the notion of a collaborative curriculum in higher education, it is easy to see where a collaborative approach would be a radical departure from more mainstream methods of education found across the university. It would require that students share a common mission as well as a common risk. The requirement for joint ownership presents difficulties when applied to a teacher-centric lecture-based model of education, and where class sizes tend to be very large and students are each given the same information, then required to give it back with some assimilation in the form of an examination. This creates some logistical questions, such as how an examination would be administered in a collaborative environment. Furthermore, how would an individual student's skills be fairly assessed? In a studio environment that uses a student-centered project based learning model, how much influence has the current classroom model had in structuring the answers to these questions, and could there be a better way?

Collaborative education presents some unique dilemmas that must be addressed when implementing a collaborative model (Werner 1996) that include:
1. Stakeholder buy-in / engagement
2. Equitable sharing of responsibility
3. Grading and assessment

Despite the difficulties associated with implementation of a collaborative model there is still strong interest in its potential. Citing the many advantages of a collaborative model, Van Weert (2003) offers the following regarding collaboration, "collaboration intensifies the human aspects of learning. It increases our learning potential and empowers us with the knowledge of others." (pp. 74)

2.3.1   Preparing for collaborative learning

When incorporating collaborative techniques it is often critical to provide adequate orientation to learners on the objectives and processes of collaborative learning. This can be especially true with learners whom either have no previous experience with collaborative learning or previously had a negative experience as a collaborative learner. Bosworth (1994) points out a key difficulty in obtaining learner buy-in is that most college students enter college based on an individually competitive model where teamwork is counterproductive to the goal of college admission and individual achievement. It is critical to obtain "stakeholder buy-in" on the concept of collaborative learning at the earliest possible stages in a course that utilizes the collaborative model.

The orientation process starts with an understanding of the fundamental change in roles of both learner and instructor. This involves the student shifting from a role of passive learner to actively engaged in the learning experience (Barkley, Cross and Howell-Major 2004). Bosworth (1994) identifies five basic skills that are needed for learners to effectively engage in collaborative learning: Interpersonal skills; Group management skills; Inquiry skills; Conflict resolution skills; Synthesis and presentation skills. Each addressed in the Bosworth's Taxonomy of Collaborative Skills and represented in Table 2.1 below. The instructor must also make a shift to accommodate this paradigm by shifting some authority to the students so they can take a more active role in their education. Another key area of consideration was assessment which is discussed further in Section 2.3.5.

Table 2.1
Comparing Student Roles in the Traditional vs. Collaborative Classroom
(From Barkley 2004, pp. 30)

Comparing Student Roles in the Traditional vs. Collaborative Classroom	
Traditional Classroom (students shifting from)	**Collaborative Classroom (students shifting to)**
Listener, observer, and note taker	Active problem solver, contributor, and discussant
Low or moderate expectations of preparation for class	High expectations of preparation for class
Private presence in the class with few or no risks	Public presence with many risks
Attendance dictated by personal choice	Attendance dictated by community expectations
Competition with peers	Collaborative work with peers
Responsibilities and self-definition associated with learning independently	Responsibilities and self-definition associated with learning interdependently
Seeing teachers and texts as the sole sources of authority and knowledge	Seeing peers, self , and community as additional and important sources of authority and knowledge

For many the transition to a collaborative model of learning can be quite challenging without an adequate orientation to the process. Collaborative learning is a skill, and like any other skill, it must be learned (Straus 2002). In the early stages of a course that uses a collaborative model the instructor must help the students to develop the requisite teamwork skills to be successful in the course. This is often achieved by developing a series of group based exercises that help to transition authority and responsibility to the students (Barkley, Cross and Howell-Major 2004) in a way that helps the learners to develop Bosworth's collaborative skills.

2.3.2   Building the team

> There are two ways of being creative. One can sing and dance. Or one can create an environment in which singers and dancers flourish.
> – Warren G. Bennis

At the heart of a successful collaborative learning experience is the creation of an environment that will embrace and nurture the ideals of successful teamwork. The initial step to collaborative engagement in the classroom is the establishment of learner groups or teams. Barkley (2004) establishes three basic topic areas that must be considered when forming learner groups: group types, group size, and group membership.

It is important to understand the different types of learning group structure and in what settings they can be the most effective. Barkley establishes three typologies for groups: *formal*, *informal* and *base*. In determining the format that is most appropriate the instructor must first consider the duration of the learning exercise since each formats is tied to a specific duration. The format with the shortest duration is the *informal group* which can be formed quickly and is typically intended that the participants work together for a brief period of time. Often the informal group participants are randomly assigned decreasing the odds of a homogeneous group and thereby increasing the odds of a more diverse interaction for all group participants.

Formal groups are often utilized when the task being pursued are of greater complexity and/or longer duration. The *formal group* is assembled at the outset of task assignment and participants will continue to work together until the task is completed. Based on task complexity the typical duration for a formal group learning experience will range from a period of several classes to several weeks. The makeup of the group can be either heterogeneous or homogeneous and there is research to support the use of both paradigms (Cranton 1998; Johnson et al. 1991; Sharan and Sharan 1987, 1992).

Heterogeneous groups bring an inherent diversity of background, ideas and experience and as a result will foster stimulating, even lively, discussions, though at the potential cost of performance and overall product outcome. As a counterpoint, a homogeneous group brings the ability of a more refined product outcome and streamlined group performance due to the innate similarities in background, ideas and experience coupled with the greater probability of complimentary skill-sets of group participants. This too comes at a price in a lack of diversity. Typical sizing for a formal group is a minimum of two participants and a maximum of six with a group of five giving best results for both formal and informal groups (Bean 1996, pp. 160).

The final format is the *base group*. Johnson describes the base group as "long-term, heterogeneous cooperative learning groups with stable membership whose primary responsibility is to provide each student the support, encouragement, and assistance needed to progress academically" (1991, pp. 4). The duration of a base group learning experience is the full length of the course. Johnson found that the optimal size for base groups was between three and four participants.

In *Organizing Genius,* Bennis (1997) discussed what he called "Great Groups". By his definition great groups are the ones that achieve extraordinary results and included in his examples are Disney with the creation of the first animated feature film and their continued work as they transitioned into the age of computers. Another example cited is to work of Apple cooperation and their continued tradition of innovation. Though more specifically targeted at practitioners than academics, the criteria outlined by Bennis identifies the traits inherent in great groups in any context and still has significant meaning in the framework of collaborative learning. Many of the following fifteen *"criteria of great groups"* (Bennis and Biederman 1997) can be found in the collaborative learning classrooms.

1. Greatness starts with superb people
2. Great groups and great leaders create each other
3. Every great group has a strong leader
4. The leaders of great groups love talent and know where to find it
5. Great groups are full of talented people who can work together
6. Great groups think they are on a mission from God
7. Every great group is an island — but an island with a bridge to the mainland
8. Great groups see themselves as winning underdogs
9. Great groups have an enemy
10. People in great groups have blinders on
11. Great groups are optimistic, not realistic.
12. In great groups the right person has the right job
13. The Leaders of great groups give them what they need and free them from the rest
14. Great groups ship
15. Great work is its own reward

Of particular interest in the realm of architectural education is item number two on this list. The notion that great leaders are a product of great groups (and vice versa) is a very powerful concept and certainly worth further consideration.

2.3.3 *Designing a collaborative learning course*

> Collaborative learning tasks will most likely be more compelling and effective if they are integrated into a course that has been designed to be learner centered (Barkley, Cross and Howell-Major 2004, pp. 59)

The structure that underpins a collaborative learning course is crucial to the success of collaborative coursework. As noted in the quote above, a student-centric model, as found in the architectural design studio, is ideally suited for collaborative learning. This starts with the structure of the classroom, unlike a lecture

In considering how to develop a collaborative learning course it is useful to refer to the cognitive domain of Bloom's Taxonomy of Educational Objectives (1956) where he identifies three critical considerations for designing a course: identify the most important

educational objectives for the course; develop learning exercises at an appropriate level for the learner; develop assessment methods that evaluate students at a correspondingly appropriate level. Barkley (2004) builds upon these ideas by offering four "considerations" that the instructor should be mindful of when developing a new course. The learning exercise needs to be fundamental to the learning objectives of the course as to not be considered "busy work". The learning exercise needs to meet the abilities of the students as to insure the students don't get discouraged by it being too easy or too difficult. The learning exercise should promote interdependence in such a way that each student has a responsibility to contribute to the group while also being dependent on the other group member for their contribution and the group's overall success. In developing a collaborative course there needs to be a method of instituting individual as well as group accountability for the work completed by the group.

2.3.4   *Enabling collaborative learning*

It is critical that the instructor creates an environment that enables student collaboration (Bruffee 1999) by acting as a facilitator of collaboration. This requires that the instructor relinquish much of the everyday control of the learning to the student groups while the instructor remains in charge of maintaining the structure of the course. Due to the fluid nature of a social learning environment like the collaborative classroom the instructor needs to be prepared to make adjustments on short notice to the course structure to insure an optimal experience for the learners. Adequate preparation on the part of the instructor is also a key consideration and this is best achieved by "…planning each phase of the collaborative activity, from how to form groups to how group work will be evaluated."(Barkley, Cross and Howell-Major 2004, pp. 56) It is worth noting that an appropriate environment for collaboration extends to the physical resources of the classroom. Many of the resources on college and university campuses are situated to

facilitate a teacher-centric model of learning with a lectern at the front of the room and all of the chairs and desks facing the lectern allowing each of the students to see the instructor and any visuals associated with the dissemination of knowledge (see figure 2.14). Since the nature of the collaborative classroom is to shift the general dissemination of knowledge from instructor to student the class room needs to be configured in such a way that it encourages discussion and ongoing interaction between learners. Figure 2.15 shows how the same twenty-five foot by forty foot room might be configured to better facilitate learner collaboration.
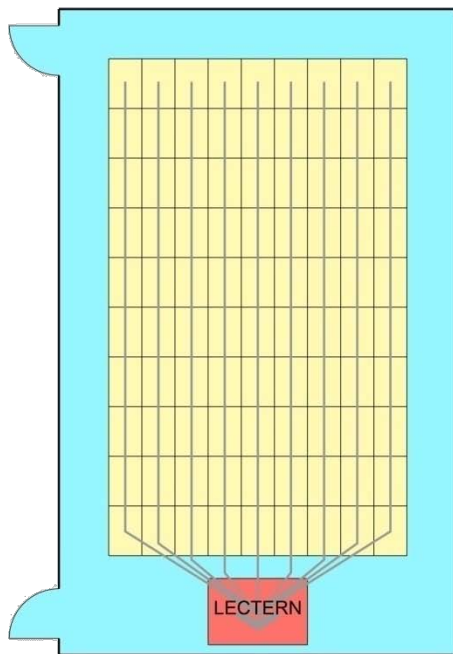
Figure 2.14
Instructor-centric classroom layout
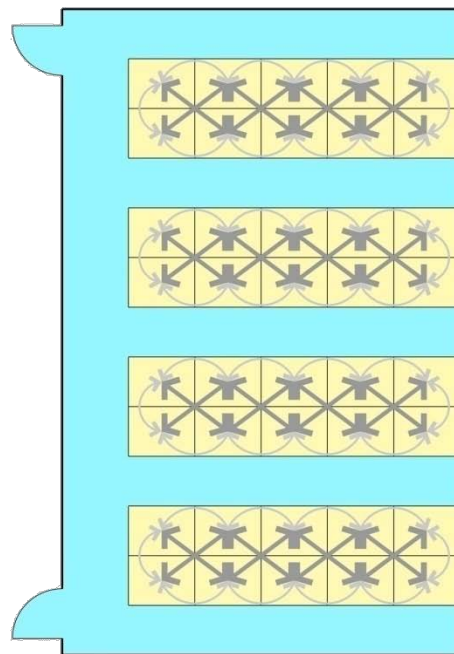
Figure 2.15
Learner-centric classroom layout

2.3.5   Assessing collaborative learning

Barkley notes that a difficulty that must be addressed on the part of the instructor is how to ensure individual accountability while at the same time maintaining positive group interdependence. She goes on to say that "Individual grades provide a mechanism to ensure individual accountability but they may minimize the importance of the group effort… Group grades ensure that the group is held accountable and that members support each other's learning, but if individuals are not held accountable, group grades create opportunities for 'easy riders' to avoid responsibility" (2004, pp. 83). As with all assessment the struggle becomes how to fairly evaluate the contributions of each member of a group as well as the cumulative effort of all group members. Grading is often noted by teachers as being their least favorite part of the job (Millis and Cottell 1998) and group assessment often adds to the anxiety associated with grading because instructors try to use the same assessment tools that they use to assess individual learners. The use of a collaborative model requires the development of alternative assessment tools since evaluation can no longer be conducted on an individual basis. Assessment can include the use of alternative tools such as peer assessment, self assessment, group assessment, instructor assessment, and reflective journaling. A holistic approach to the process of grading that is tightly interwoven with the learning objectives of the course therefore becomes a critical element in the evaluating of collaboratively based courses (Barkley, Cross and Howell-Major 2004). In addressing the topic of a holistic approach to grading Walvoord and Anderson (1998) conclude that

> Grading… includes tailoring the test or assignment to the learning goals of the course, establishing criteria and standards, helping students acquire the skills and knowledge they need, assessing student learning over time, shaping student motivation, feeding back results so students can learn from their mistakes… (pp. xi)

2.4   Collaboration in Professional Education

> Communication is a process of sharing experience till it becomes a common possession (Dewey, pp.11)

In considering the education of architects, it is beneficial to look at the pedagogical techniques of other professions. Other disciplines including law, medicine, engineering, and nursing, have been more proactive in the incorporation of collaborative methodologies into their respective curriculums and therefore offer insight on how collaborative learning opportunities can be integrated into an architectural education.

2.4.1   Collaboration in educating the medical disciplines

There has been extensive research done in the profession of nursing in particular, looking at the need for collaborative models of education. One such example of this research is work done by Singleton and Green-Hernandez (1998) on the development of an interdisciplinary model of education for primary care. This study explores models of interdisciplinary education through a historical context, focusing on the benefits, barriers and approaches to implementation. Despite a long standing tradition of collaborative disciplinary education in the form of clinical training, the nursing profession continues to struggle with implementation of interdisciplinary models of education. While the profession continues to see an increased demand for interdisciplinary collaboration due in large part to a shift in healthcare strategies from a cure based approach, to care based approach, which is based largely on the increased longevity of patients and the survivability of once deadly illnesses.

In examining collaborative efforts in nursing care and education this study cites evidence of greater patient satisfaction, better outcomes and increased cost effectiveness as a result of interdisciplinary collaboration. (Baldwin 1994; Beloff and Korper 1972) A push

for greater interdisciplinary cooperation Singleton and Green-Hernandez do note in their study that "The education of health professionals rarely teaches how each profession can work together towards common goals of patient care." (pp. 6) They also point out the importance of the acknowledging the individual skills and perspectives that each member of a collaborative group brings to the learning experience and stress the importance of avoiding "students setting next to each other as unknown neighbors"(pp. 5). The Singleton and Green-Hernandez study also notes challenges associated with the implementation of an interdisciplinary education stating

> Although interdisciplinary education may better prepare students for the changing healthcare environment where they will practice, the professions do not appear to be completely comfortable with each other, and faculty often present a barrier to an interdisciplinary approach to education. (1998, pp. 4)

In another study, Burbank (2002) and her colleagues study the development of an interdisciplinary geriatric curriculum. This study discusses the Rhode Island Geriatric Education Center (RIGEC) which is a joint effort between three institutions of higher education, a community based provider and an advocacy group for the purpose of enabling collaborative interdisciplinary education. Burbank and her colleagues acknowledge strides made in the profession in terms of interdisciplinary collaboration and the plethora of literature to document it while pointing out the lack of publications focused on the implementation of collaborative programs in medical education. This work focuses specifically on the development of a collaborative curriculum in geriatric care reporting on the pitfalls and benefits discovered in the process of implementation. In looking at the motivations for this study Burbank points to the paradox associated with the need for medical professionals to be able to effectively work as members of interdisciplinary team when treating the complex issues associated with geriatric care and lack of preparedness on the part of medical professionals to do so saying

> …interdisciplinary clinical teams of health care professionals have been widely recommended as the most effective way of meeting these challenges. Although much attention has been given to the use of interdisciplinary clinical teams, the education of individual team members remains almost exclusively within the domain of their respective professions. (2002, pp. 452)

Much of the work of Burbank and her colleges at the RIGEC is based on the research of Toner, Gurland and Miller (1994) where they developed an approach to the creation of interdisciplinary teams that they called the Program for Organizing Interdisciplinary Self-Education (POISE). It was their position that members of an interdisciplinary team require special training to effectively collaborate. The POISE model has two central premises: Traditional methods of instruction that personify didactic methodology, charismatic leadership and training of the individual should be avoided in favor of interdisciplinary techniques and the importance "self education" in learning to be an contributive member of an interdisciplinary team. POISE places a specific emphasis on the students need to be an engaged active learner as they develop the requisite teamwork skills to be an interdisciplinary collaborator. Burbank also notes that a critical part of learning to be an interdisciplinary collaborator is understanding the need to incorporate the values and views of each of the professions (or participants) included in the group despite the fact that each may (and in all likelihood will) be based on a different foundational model.

Burbank notes that when an instructor chooses to utilize a collaborative model of teaching it is important to understand the series of processes that all groups will undergo as build a sense of cohesiveness citing the work of Bruce Tuckman (1965). In the *Development Sequence of Small Groups* Tuckman identifies four distinct processes that all small groups undergo as transform from a group of individuals into a cohesive team: Forming, Storming, Norming, and Performing. Forming is concerned with operational dynamics of the new team and trust building between learners within the group.

Storming is a process that involves contending with process issues. During the storming process differences in values, beliefs and personalities become evident and the probability of conflict is high. As part of this process it is critical to workout issues of intergroup communication in order to maintain a viable group. Norming, occurs when the group has learned to work through periods of difficulty and/or conflict. As the group develops norms begin to emerge dictating how the group will function and address issues of difficulty. At this point mutual respect and trust between group members has become evident. The final process in the series, performing, is evidenced in the successful completion of mutual goals and the ability to realize desired outcomes.

Burbank (2002) and her colleagues also address some of the potential pitfalls or roadblocks that are likely to be encountered in the process of implementing a collaborative course of study. Some issues are institutional such as accreditation and others are social or interpersonal in nature. In many cases, especially in professional education, the accreditation criterion for the particular discipline mandates that the faculty member's credentials must match the program they are teaching in. In other words a faculty member must be of the same profession that they teach. While on the surface this does make sense Burbank points out that it effectively prevents interdisciplinary education. Burbank contends that by precluding the ability to bring in faculty members from other related disciplines learning opportunities are lost. One of the examples cited is the use of a faculty from social work that specializes in geriatric issues to teach in the gerontology program is not permitted under accreditation criteria despite being clearly interrelated. Other difficulties can and often do arise in interdisciplinary education between fellow faculty members and administrators due to differing perspectives, professional values and goals for client care (Clark 1997). It is the position of Burbank that each of these issues can be addressed and should not dissuade those interested in pursuing collaborative efforts.

2.4.2 Collaboration in law school

The advent of the clinical model of legal education marked the first institutionalized model of collaborative legal education in the United Stated. Developed in 1972 at Antioch Law School in Washington, D.C. it follows closely with the clinical model used in schools of medicine and nursing. Despite ongoing resistance, this model has now been adopted, at least in part, by nearly every law school in the United States.

Over the past decade there has been a push to further integrate collaborative and cooperative techniques into support classes such as legal analysis and writing (Reilly 2000). Examples of how law schools have been trying to address issues related to collaborative techniques can be found in the work of Jane Mueller-Peterson. In *A Collaborative Approach to Teaching Legal Analysis* (2001) Mueller-Peterson documents her experiences using collaborative methods in a legal writing course. The two case studies address methods of application and the results experienced over the course of the class. The author explains that the subject matter of the course being taught was on legal analysis where the emphasis is writing and research and was an introductory course for first semester law students. In structuring the course Muller-Peterson chose to randomly assign students to one of six small groups of four students each. The students remained in these groups for the duration of the semester and would work together on all collaborative exercises. All efforts of student collaboration were split between two distinct elements of the class "Collaborative Analysis" and "Peer Editing Workshops".

The initial part of the class focused on the process of Collaborative Analysis by allowing students to "struggle together" on the first written assignment of the class. As part of this process the students worked together to craft an argument on one side of a particular issue; then when complete would work jointly to craft an agreement for the opposing viewpoint on the issue. After attaining a thorough understanding of both sides of the

argument the students were then asked to generate an objective paper for the assignment. Mueller-Peterson found that when compared with a more conventional teacher-centric course taught by the same instructor and covering the same course material "The end products were vastly superior to those of the preceding year on the same problem." (pp. 4)

In the second collaborative component of the course the author and two graduate teaching assistants periodically conducted peer editing workshops where the "students attended their workshops with the members of their four-person discussion groups. In all, twelve students attended each workshop. Each brought to the workshop four copies of a written draft of the paper, one for each member of the four-person discussion group." (pp. 4) During the workshop each of the four students papers were read and then openly discussed or critiqued between the members of the group. The instructor and graduates assistants monitored the groups providing direction and/or mediation when necessary. As a result of the course the Mueller-Peterson came to the conclusion that "…classes were more enjoyable and helpful to more people because of the increased participation that group work requires" (pp. 5). She also notes that the collaborative format allowed for more student/faculty exchange and more student/student peer exchange and resulted in immediate or nearly immediate feedback to the students increasing their overall productivity. This also had an impact in the overall quality of the education that the students received by creating an opportunity for the students to see a variety of approaches to addressing an assignment and hear the associated feedback allowing for a more comprehensive understanding of the instructors evaluation expectations.

In *"Can't we all just get along?"- Cooperative legal writing assignments* (2001) James Levy looks at collaborative and cooperative learning in very general terms pointing out strengths and weaknesses of the two models in comparison to the more familiar teacher-

centric model. Levy, a clear proponent of cooperative learning, asserts that the purpose of cooperative learning as he sees it "is both to instill in them confidence in their ability to understand the legal principles at stake and to impart self-reliance in the ability to edit their own drafts effectively." (pp. 5) Levy found in examining cases that utilized group based techniques such as cooperative or collaborative learning that the "students who worked together typically learn the material better than students who work in isolation." (pp. 1) He continues on to say that the students "…often help each other understand the material at much greater depth than can be accomplished just through class discussion." (pp. 1) He also notes that "…brainstorming collaboratively provides students with the kind of immediate feedback that is critical to learning new skills…" (pp. 1)

Though much of the insight into cooperative learning was positive, Levy did have points of concern. He warns that "cooperative work groups can undermine student learning if we don't establish ground rules that ensure all students do their fair share of the work." (pp. 1) Stating that one of the primary concerns in assigning group based work is that "assignments that permit students to work together, therefore, must be carefully designed so they provide the benefits of a cooperative work experience while minimizing the impact of the 'free-rider' effect." (pp. 5) Levy points out that through the use of appropriate techniques the instructor can alleviate some of these concerns. He suggests that the groups of learners be limited to a maximum of three students and that the students be required to maintain a research log or journal as evidence of the individual work generated by each student.

Similar findings can be found in *Fostering Teamwork through Cooperative and Collaborative Assignments* (2001) where Rossembaum and Zimmerman recount their experiences with incorporating both cooperative and collaborative assignments into their legal writing and analysis classes. In courses taught over a period of years the authors

found that the use of collaborative techniques in the form of peer review and critique had a positive impact on student outcomes stating "understanding of material deepens after hearing the differing perspectives of their classmates about the same material" (pp. 7). Going on to say that the "students learned the material at least as well as they had in prior years when they had worked on their own. …feedback on these projects was universally positive." (pp. 8). Like other authors mentioned here, Rossembaum and Zimmerman that the development of appropriate exercises was critical to a positive outcome in a collaboratively based course. In developing these exercises it is important to recognize the need to develop "exercises to try to create a sense of interdependence and trust in our students and try to expand their opportunities for learning beyond what we could accomplish if their interactions were limited to the classroom and one-on-one meetings with us." (pp. 7) Rossembaum and Zimmerman conclude by stating that "When the collaborative teams worked together effectively, the group members described their experience as 'seeing inside someone else's mind' and said that their understanding of the subject grew exponentially" (pp. 8).

Zimmerman has published a number of other articles on the use of the cooperative and/or collaborative techniques seminal among them is *Thinking Beyond My Own Interpretation: Reflections on Collaborative Learning and Cooperative Learning Theory in the Law School Curriculum* (1999). In this piece Zimmerman examines the multi-faceted teaching approach of collaborative learning and it application to the legal education. Much of this work is focused on the utilization of collaborative techniques in the legal curriculum and more specifically the legal analysis and writing curriculum and he reflects heavily on his teaching experiences in the classroom. Zimmerman gives some historical context stating that "Prior to the advent of clinical programs, the skills taught in legal education did not include any aspect of working with others or reflect the realities of the practice of law. Clinical education now includes learning and mastering group interaction

and group dynamics in the context of client representation."(pp. 967) but notes that beyond the clinical component of the legal education the willingness to adopt collaborative methodologies has encountered difficulties. He notes that "attempts to use collaborative and cooperative learning in legal education typically encounter barriers ranging from institutional constraints to outright hostile reactions" (pp. 965-66). There are a number of reasons for this institutional resistance to collaborative and/or cooperative pedagogies in courses such as legal analysis that include competiveness, teacher control, grading, authorship and individualism. (Bruffee 1999; Dewey 1916; MacGregor 1990; Millis and Cottell 1998; Vygotsky 1978) As Zimmerman further examines his research indicates that students "respond more positively to these assignments because they are predictable, manageable, and provide desirable evaluative feedback". (pp. 960) When speaking specifically about cooperative and collaborative pedagogies Zimmerman notes that "studies demonstrate that these pedagogies, when compared with a competitive learning environment, produce higher levels of student achievement, increased development of student judgment, and more positive student attitudes toward learning". (pp. 960) These represent some of the obvious reasons to integrate cooperative and collaborative pedagogies. There are also less overt benefits to these pedagogies that are pointed out in this research, in particular, the impact on the stress level of students. The author's research indicates that "Stress is rooted in any aspect of a workload that is demanding, unpredictable, or uncontrollable. This, in turn, impedes performance, information gathering, and information processing." (pp. 968). Going on to conclude that "pedagogies such as cooperative learning and collaborative learning, which develop critical thinking and judgment while minimizing or reducing student anxiety levels, should be readily embraced." (pp. 970) With many pushing for ways to decrease stress levels on students in higher education (Boyer and Mitgang 1996;

Jones and Johnston 2000; Segerstrom 1996) this seems to be another validation of the value of collaborative engagement.

2.4.3   Collaboration in design education

> A camel is a horse designed by committee… Vogue Magazine, July 1958

There is often a negative stigma attached to the use of cooperative or collaborative pedagogies in the design profession. However, like many of the other forms of professional education already mentioned, there is a history of collaborative work in the design studios of the disciplines of engineering, industrial design, urban design, landscape architecture and architecture. Group work in the design studio and has been found in various iterations over the past few decades to include intradisciplinary studios (Cossentino 2002), interdisciplinary studios (Cannon 2002) and community based studios (Oppenheimer-Dean and Hursley 2002). However, it is far less common to see the use of collaboration as defined earlier, fully integrated into a design curriculum, despite the acknowledgment of the collaborative potential of the design studio (Crosbie 1995; Dinham 1987; Shaffer 2002). Working with others in the context of a design studio is a skill learned through experience and repetition and one that does not often come easily (Cannon 2001, 2002; Daniel 2002), in large part due to a negative predisposition towards group work on the part of both student *and* professor. Despite this inclination, there are a growing number of examples of collaborative learning being done in the design studio.

One recent study by Linda Groat (1997) and her colleagues examine the role that architectural education could play in the transformation of the profession of architecture. The research, entitled *Voices for Change in Architectural Education: Seven Facets of Transformation from the Perspective of faculty Women,* examines the core seeds of potential change: (1) Championing the ideals of a liberal education; (2) Forging interdisciplinary connections; (3) Experimentation; (4) Teaching Beginning design as a

connection to other disciplines; (5) A communicative environment; (6) Collaboration; (7) Caring for students. Of particular interest to the research being conducted for this dissertation are items two, five and six. In this qualitative study the seven criteria are examined through the lens of female faculty member interviewed in the early 1990's. Interestingly, there are very strong parallels to be drawn between this research and Boyer's work in *Building Community* (1996) which was completed during the same time period. Groat notes this fact by saying "…correspondence between our analyses and the Carnegie [Boyer] report's recommendations. Taken together, these recommendations constitute a consistent and powerful argument for the visions for architectural education."(Groat 1997, pp. 273) These are discussed further below.

In the course of Groat's research approximately forty faculty women were interviewed under three broad themes: attractions to architecture as a profession, career experiences, and visions for architectural education. This last theme garnered a wealth of information related to educational reform and collaborative enterprise. Significant attention has been focused on the need for educational reform from the perspective of women faculty and the discontinuity between the architectural practice today and a pedagogy that has failed to keep pace with the needs of the profession (1997). Currently women make up a small percentage of the faculty members in architecture programs nationwide but it is because of this that Groat feels that faculty women in architecture can and will play a special role in the transformation of architectural education stating "we believe that the "marginal" roles traditionally assumed by female faculty may actually be fundamental to the inevitable transformation of architectural education." (Groat 1997, pp. 272) continuing with "marginality is also enabling as 'the site of radical possibility, a space for resistance. …enables them not only to see the inherent contradictions and inequities at the center, but also claims the 'space' from which important alternatives may be launched. " (Groat 1997, pp. 273) She also notes that "creative advances in the field may depend on the

substantive contributions of nontraditional academics who can challenge and explore the boundaries of the discipline. …the most significant work in a field can be uncovered 'simply by walking along its boundaries." (Groat 1997, pp. 271); noting that systemic change will need to occur from the outside in rather than the inside out.

> The interdisciplinary moment is not a fad, but a fundamental and long-term restructuring of the nature of scholarly activity. James Dunderstadt (1995, pp. 6)

A majority of the work done by Groat and her colleague's focuses on the specifics of what needs to be addressed in the reform of architectural education: Greater focus on collaborative enterprise and the need for greater interdisciplinarity. The author points to the nearly exclusive focus on the development of the individual architect without recognition of the highly collaborative nature of professional practice stating "instead of individual achievement and competition, the focus [should be] on group learning… Unfortunately, these skills are frequently not emphasized in higher education". (pp. 281) She takes the position that this problem finds its origins in practice rather than the academy pointing to "the field's tendency to worship the individual stars, rather than acknowledge the essential teamwork required in any successful building project." (pp. 282) This point was taken further by one of the faculty women interviewed in this study when she stated "I think there's a kind of encouragement of the star system …this huge amount of competitiveness and discouragement of collaborative work. …that you're only good if you are a great designer." (pp. 282) This recognition of the role of teamwork (collaborative enterprise) in the design, development and realization of all architectural projects is the fundamental first step in the reform of architectural education towards greater collaboration. The complexity of architectural projects has long demanded the active engagement of multiple parties to realize an architectural project. A need that has only increased as with more complex designs, materials, and tighter delivery schedules, the authors note that "the scope of architectural enterprise is so broadly based that the

need for thinking and working collaboratively is absolutely central." (pp. 281) The theme of collaboration was also a topic of considerable focus for the faculty women interviewed in Groat's research, as noted by the authors, "our respondents discussed so many interrelated and overlapping aspects of collaboration, it even became difficult for us as researchers to maintain consistent coding categories by which to analyze the interview transcripts." (Groat 1997, pp. 281) The strong level of interest on the part of the respondents of this study indicates a topic worthy of further inquiry.

 In addition to gaining a greater recognition of the role of team based pedagogy (cooperative, collaborative or otherwise) is the need to further examine the potential replicating of the highly interdisciplinary nature of design practice in the classroom context. The design studio is equally suited for collaboration within and across disciplines. While discussing the design studio Groat asserts that the "benefit of architectural education is that its inherent interdisciplinarity fosters a natural meeting ground with its allied disciplines." (pp. 275) Each of the design professions are interdisciplinary to some extent, requiring the expertise of additional disciplines to realize or deliver an end product, though few to the same degree of the architectural profession because "architecture is inherently interdisciplinary – touching as it does on a broad range of technical, social, and artistic issues" (pp. 274) The difficulties associated with the incorporation cooperative and collaborative learning are only multiplied when trying to incorporate other disciplines. This is at the heart of the challenge that faces architectural educators and was presented as such by Boyer in *Building Community* (1996) "making connections, both within the architecture curriculum and between architecture and other disciplines is, we believe, the single most important challenge confronting architectural programs" (pp. 85) a challenge that more than a decade later still faces both the profession and the design academy.

Graham and Geva (2001) took a decidedly interdisciplinary approach in their research on bringing together students of architecture and construction science for a joint course focusing on the design-build project delivery method. There are two general forms of design-build courses offered in architecture programs across the United States. The first is a can be generalized as a hands on approach where the designer actually partakes in the physical construction of the project that they have designed. Examples of this approach would include the work of the Rural Studio at Auburn University (Oppenheimer-Dean and Hursley 2002, 1998), The Studio at Large at the University of Washington (Palleroni and Merkelbach 2004), and the work of Steve Badanes at various universities across the country (Piedmont-Palladino and Branch 1997). The other form of design-build course and model used by the Grahm and Geva in this research can be described as a project delivery method in which one party enters into a single contract with the owner to provide architecture/engineering design and construction services as a single service. (Dorsey 1997)

In this course the authors combined students from the third year architectural design studio (6 cr. hr.) and fourth year a construction science course on alternative construction delivery systems (3 cr. hr.) into a single design studio where they were given the design problem of design an embassy for a predetermined country on embassy row in Washington, D.C. The students were given the task of preparing a single source contract package for a fictitious owner that included a design proposal, a conceptual project cost estimate, a conceptual project construction schedule, a cost-revenue curve, and value engineering analysis. In establishing this course the authors stated that their primary motivation for doing so was because "the design-build studio project provides a perfect framework (see Figure 2.16) in which to initiate an interdisciplinary architectural studio that responds to the recommendations of the 'Boyer Report'" (pp. 75) also know as *Building Community: a new future for architecture education and practice* (Boyer and

Mitgang 1996). Graham and Geva explain that "interdisciplinary in this instance means the combination of architectural design and building construction science students in one educational laboratory [studio] setting." (Graham and Geva 2001, pp 76) At the outset of the course the authors had three goals (1) Provide to the students of each discipline an understanding of the process of design, construction and design build; (2) Create a realistic environment in the design studio for pursuing design-build projects (simulating the professional practice); (3) Develop the students' skills in working in interdisciplinary teams.
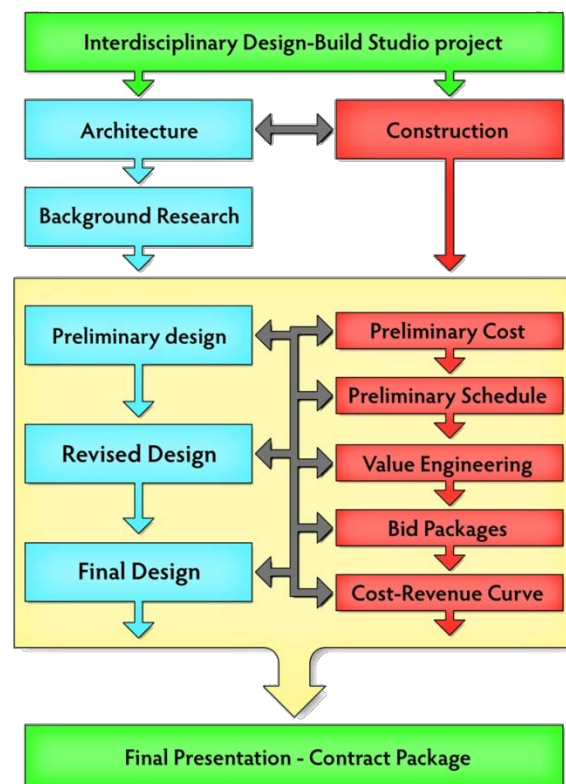
Figure 2.16
The Procedures of the Joint Project
(From Graham & Geva (2001, pp. 52)

This study concludes with a series of recommendations on how to conduct similar courses and why there is the need for formal institutionalization of these classes. At the

conclusion of the course as part of the course evaluation the authors administered a questionnaire asking a series of questions about the course. The authors note that "responses indicated that they were excited about this type of joint studio project". (pp. 89) As part of this process the students did offer some suggestions for possible improvement in subsequent offerings "primarily focusing on the logistics, and timing and amount of joint meetings. …indicated that time should be allocated for joint meetings, which should be coordinated by the instructors as part of the requirements/program of the project". (pp. 89-90) Another area of possible improvement noted was the need to provide formal training in partnering to the students. Because most students don't typically have experience in the area of collaborative engagement, especially in the form of interdisciplinary interaction, it was felt that this formal guidance could increase the likelihood of positive experience on the part of the students. Graham and Geva note that "activities that should be undertaken in future joint projects would be a two or three hour session in which students from the two classes was led through a team building exercise. An outside facilitator besides the instructors should lead this meeting because it is important to demonstrate the partnering workshop process to the students". (pp. 90) This is largely based on research by William Ronco (1996) and the authors experiences in conducting similar workshops within their program. The primary goal of these workshops is to "develop a mission statement and partnering goals, which are common in these exercises". (Graham and Geva 2001, pp. 90) Graham and Geva point out that the introduction of glimpses of the realities of the types of interdisciplinary interaction into the design studio course were extremely important in helping the students understand the design and construction-decision making process. They note that "the architecture students were made more aware of building materials, construction technology, and cost, while the construction science students were provided with an opportunity to better understand the process of design and the importance of architectural forms and images".

(pp. 90) In the concluding remarks of this study the authors concluding recommendations state "it is recommended that the collaboration between the two disciplines should continue in this mode of joint projects. Institutionalization of such efforts in formal syllabi will enable more effective and better coordinated schedules of the classes involved. …coordination will help to improve the educational experience for the students and prepare them for the new realities of practice." (pp. 90)

Similar to Graham and Geva, Bronet carries the ideas of interdisciplinary collaboration in the design studio further with *Product Design and Innovation: Evolution of an Interdisciplinary Design Curriculum* (2003) by looking at how to institutionalize the ideas of collaborative education through the creation of an interdisciplinary curriculum by linking the disciplines of architecture, mechanical engineering and humanities and social sciences. This research gives insight into the development of a program that has successfully bridged the three disciplines by offering two different undergraduate dual degrees, either a Bachelor of Science in Architecture *and* Science, Technology and Society (STS) or a Bachelor of Science in Mechanical Engineering *and* STS. This program sought to integrate "first-rate technical competence with a thorough understanding of the social and cultural context of the technologies and the design processes that shape them". (pp. 305) The researchers found in the establishing this new multidisciplinary curriculum that there was a need to develop within the students new skills and knowledge to address the challenges associated with the multidisciplinary environment. Many of the students could readily grasp the pragmatic inner workings of a product or artifact yet they failed to understand how that same product or artifact is capable of shaping social and cultural relationships and "in turn these relationships shape products". (pp. 305) This dual degree relationship between a design discipline and sociology help the students to take that holistic approach. Bronet adds that "the strong education in the social sciences helps understand ways of life deeply enough either to anticipate a future

need in those lives or to escape being trapped by everyday inertia". (pp. 306) The authors note that one of the primary focuses of this curriculum is developing students "ability to work well on teams". (pp. 305) They also point out that the most important step to successful interdisciplinary collaboration is to insure that the faculty members involved "are themselves multidisciplinary and understand the associated issues." (pp. 311) Now more than a decade old this program has demonstrated that when faculty and student are both actively engaged in the idea of interdisciplinary collaboration many of the perceived obstacles to this sort of collaboration can be overcome.

2.5 Summary

> Without cooperation, almost no object of consumption we take for granted can ever come into existence. (Webster 2003).

The past fifteen years have been marked by the publication of Boyer's Building Community; the push for a more sustainable or "green" approach to building construction and management; and the implementation of the Americans with disabilities Act and the Fair Housing Act, both implemented to insure equity toward the users of the buildings we create. The common thread between each of these seemingly unrelated topics is the need for greater collaboration across an ever increasing spectrum of individuals and disciplines. Through greater collaboration designers are better prepared to address the complexity of these problems and others like them.

3 METHODOLOGY

This section outlines the research methodology used to conduct this study. Topics covered include Choosing Qualitative Research, Theoretical Framework of Study, Statement of Problem, Selection of Participants, Research Questions, Human Subject Research, and Data Organization and Analysis Procedures.

3.1 Choosing Qualitative Research

The primary purpose of this study was to gain a deeper understanding of the role that a collaborative pedagogy can play in the education of architecture students. To achieve this goal a group of design educators were sought out to discuss the issues of collaboration in architectural education. This was, according to Sherwood (2001) a question about a "complex social process that involved the construction and negotiation of meaning" (, pp. 77) an undertaking that falls outside the parameters of the positivist (quantitative) research paradigm, but was well suited for naturalistic inquiry. This inquiry utilized a data collection technique referred to as qualitative research interviewing. Which is best suited for the individualized, one-on-one data collection, that was desired for this study. This process allowed for in-depth, exploratory, interpretive, open-ended data collection. Data was derived from directed conversations that were wholly unique, yet based upon a standardized interview guide (Appendix A). There are many subsets of qualitative interviewing described by Rubin (2004) and illustrated in Table 3.1. This study followed the variant described as "Ethnographic Interpretation", where the researcher sought to sketch the overall context and subject matter by identifying key norms, rules, values and traditions associated with collaborative teaching and learning in architectural education.

Table 3.1
The Variety of Qualitative Interviews
(From Qualitative Interviewing Rubin 2004, pp. 5)

	Narrowly Focused Scope	In-Between	Broadly Focused Scope
Focused mainly on Meanings and Frameworks	Concept clarification	Theory elaboration	Ethnographic interpretation
In-Between	Exit Interview	Oral histories Organizational culture	Life history
Focused Mainly on Events and Processes	Investigative Interviewing	Action research Evaluation research	Elaborated case studies

3.2   Theoretical Framework of the Study

The foundational paradigm for this study was based on the theoretical elements of naturalistic inquiry as described by Erlandson (1993) and Lincoln and Guba (1985). The nature of this study called for a framework that would allow for the many perspectives and the multiple realities that were likely to be encountered while in a diverse pool of research participants. It was understood that individuals have the ability to construct their own realities and do so based on their own personal ontology and epistemology. Naturalistic inquiry allowed for this occurrence and facilitated the capturing of the various realities that occurred in this research. The theoretical elements of naturalistic inquiry, as defined by Lincoln and Guba, are built upon five axioms or basic beliefs described below and illustrated in Table 3.2.

3.2.1   Axiom 1: The nature of reality (ontology)

In *Naturalistic Inquiry,* Lincoln and Guba (1985) state that the naturalist paradigm allows for the construction of multiple realities that can only be studied holistically, differing from the positivist paradigm, which allows for a single reality. In the case of a naturalistic

inquiry, the researcher is often engaged in a dialogue with the research participant(s); a dialogue where each party will have a different understanding of reality.

3.2.2 Axiom 2: The relationship of knower to known (epistemology)

In naturalistic inquiry the researcher is an engaged participant in the research process and not a neutral third party observer. Lincoln and Guba (1985) assert "the inquirer and the 'object' of inquiry interact to influence one another; knower and known are in separable." (pp. 37) The naturalistic researcher understands that their presence has an impact on the research participants and the research setting and as a result the research setting is neither pure nor controlled.

3.2.3 Axiom 3: The possibility of generalization

The naturalistic researcher seeks to gain an understanding of the nature of a specific phenomenon in its natural context or setting, in naturalistic research in neither desirable nor possible to generalize. Erlandson notes that "no two social settings are sufficiently similar to allow simplistic, sweeping generalizations from one to another". (1993, pp.13) While Lincoln and Guba explain that "the aim of inquiry is to develop an idiographic body of knowledge in the form of 'working hypotheses' that describe the individual case" (pp. 38)

3.2.4 Axiom 4: The possibility of causal linkages

The research setting in naturalistic research is fluid by nature and highly responsive to the contextual environment. The cause and effect relationship of the various elements of the research setting make it challenging for the researcher to differentiate cause from affect. As stated by Lincoln and Guba, "all entities are in a state of mutual simultaneous shaping so that it is impossible to distinguish causes from effects". (pp. 38)

3.2.5   Axiom 5: The role of values

As explained in Section 3.2.1 the researcher is an engaged part of the exchange or dialogue that occurs between the researcher and the research participant(s). As part of that dialogue there is a certain degree of personal baggage that the researcher brings to the research setting that includes personal belief structure or background both of which are at the foundation for individual values. The naturalistic researcher understands that their personal value structure can and will influence all that they do to include all facets of the research endeavor.

The axioms of naturalistic discussed by Lincoln and Guba served as a foundation for this research.

Table 3.2
Contrasting Positivist and Naturalist Paradigms
(From Naturalistic Inquiry Lincoln 1985, pp. 37)

Contrasting Positivist and Naturalist Paradigms		
Axioms About	Positivist Paradigm	Naturalist Paradigm
The nature of reality	Reality is single, tangible, and fragmentable.	Realities are multiple, constructed, and holistic.
The relationship of knower to the known	Knower and known are independent, a dualism.	Knower and known are interactive, inseparable.
The possibility of generalization	Time- and context-free generalizations (nomothetic statements) are possible.	Only time- and context-bound working hypotheses (idiographic statements) are possible.
The possibility of causal linkages	There are real causes, temporally precedent to or simultaneous with their effects	All entities are in a state of mutual simultaneous shaping, so that it is impossible to distinguish causes from effects.
The role of values	Inquiry is value free.	Inquiry is value-bound

3.3   Statement of Problem

Historically, the education of an architect has been a highly individualized pursuit, focused on the development of an individual skill set (Boyer and Mitgang 1996) that seldom required collaboration beyond that of student and professor and in many settings even discouraged it in a. While this individualized, hands on approach to education has been highly revered by many (Cossentino 2002; Shaffer 2003; Kuhn 2001) it often falls short of its potential and fails to recognize that the greatest design accomplishments of humankind have been the undertaking of collaborative enterprise and the complexity of current problems often demand this approach (Bennis and Biederman 1997). Furthermore, architecture students are being prepared in a manner that is contrary to the highly collaborative nature of the architectural practice they will enter (Crosbie 1995) without taking away from the inherent strengths of the traditional architectural education.

3.4   Selection of Participants

A group of qualified participants were purposefully selected through both literature and referral to be interviewed regarding the role of collaboration in the process of educating future architects. The participants included past and present deans, department heads, professors of all rank, tenured and not. The participants represented a variety of institutions, both public and private, and included institutions ranging in type from liberal arts schools to land grant universities.

The primary criteria for participant selection was that the participant be an educator at an ACSA member and NAAB accredited institution with a demonstrated interest and/or expertise in the use of collaborative techniques in design education and/or the development and implementation of a collaborative curriculum. Potential Participants were identified and contacted in writing to request their participation in the study. As

initially expected participants did lead the researcher to other qualified participants that were ultimately included in this study.

Initially it was assumed that only a percentage of those identified would choose to participate. More than seventy five percent of those initially asked to take part in the study did participate in the interview process. The target sample size for this study was fifteen interviewees; ultimately fourteen interviews were conducted for this research. The interviews were designed to last approximately one hour and were based on an interview guide (Appendix A). The actual interviews varied in length from forty minutes to an hour and forty-five minutes, with the typical interview lasting just over one hour. The interview guide served as the basis for each interview conducted, though not as a rigid outline. Deviation from the interview guide based on responses to previous questions was expected since the interview guide was designed to specifically allow for questions that arise as part of the interview process. The core set of questions were not intended to be restrictive and were supplemented as required based on participant response.

3.4.1   Participants demographics

The following table (Table 3.3) outlines the participants in this study. The descriptors used in this table include the position held by the participants at their institution; the rank of the participant; the type of institution the participant is affiliated with (public or private); the size of the affiliated institution; and the regional location of the affiliated institution. All of the names used are pseudonyms to protect the identity of the respondent.

Table 3.3
Participant Demographics

Participants	Position	Rank	Institution	Size	Location
Jim Smith	Vice President	Professor	Public	Medium	Midwest
Tom Clark	Vice President	Professor	Public	Medium	Midwest
Judy Wilson	Dean	Assoc. Prof.	Public	Medium	Western
Jeff Thompson	Dean	Professor	Public	Large	Mid Atlantic
Bill Peterson	Dean	Professor	Private	Small	Mid Atlantic
Steve Johnson	Director	Professor	Public	Medium	Midwest
Mark Jones	Faculty	Assoc. Prof.	Private	Medium	Northeast
Fred Jackson	Faculty	Asst. Prof.	Public	Small	Northeast
Arthur Phelps	Dean	Professor	Public	Large	Midwest
Sam Wright	Director	Professor	Private	Medium	North
Ted Peterson	Director	Assoc. Prof.	Public	Medium	South
Joe Stevens	Dept. Head	Assoc. Prof.	Public	Small	Southeast
Matt Connors	Dean	Professor	Public	Medium	Southeast
Roy Brown	Assoc. Dean	Assoc. Prof.	Public	Medium	Southeast

Small < 10,000 students (Undergrad + Graduate), Medium < 20,000 students (Undergrad + Graduate), Large > 20,000 students (Undergrad + Graduate)

3.5   Research Questions

This research proposed four research questions for the investigation. Each of these questions was explored through the course of the interviews with the study participants. The first three questions sought to identify the current state of collaborative pedagogy in architectural education. The next sought to identify which particular course types are more appropriate when attempting to integrate collaborative techniques. The remaining question addressed facilitators and barriers to implementation of collaborative learning environments.

a. *How do the study participants view current state of collaborative pedagogy within architectural education?*

b. *What role does collaborative enterprise play in the education of an architect? What role should it play?*

c. *How does collaborative engagement change the creative process?*

d. *What role does the design studio hold for the collaborative education of architecture students? Why is the design studio a forum more appropriately suited for the implementation of collaborative techniques than the more ubiquitous lecture based courses? How do collaborative efforts impede the current agenda of the design studio curriculum?*

e. *What barriers and facilitators exist in the implementation of a collaborative model? How might the barriers be overcome?*

3.6   Human Subject Research

This research involved human subjects as interview participants and in accordance with the requirements of the Graduate School this research was subject to oversight by the Institutional Review Board. The Institutional Review Board (IRB) is in place to insure that the rights of human subjects are protected in the course of research being conducted. I submitted a research protocol application of approval to the Office for Protection from Research Risks (OPRR) which implements and oversees IRB at Texas A&M University. Due to the low risk involved in this study I was granted an exemption from full review and the protocol was approved on December 1, 2004. The protocol has been subsequently renewed on an annual basis.

A key issue of concern when research involves human subject is that of confidentiality. It was explained to each participant that the confidentiality of their identity and subject matter of our conversations was of the utmost concern and as a researcher it was critical to establish and maintain a trusting relationship with the participants (Smythe and Murray 2000). At the outset of each interview, participants were given a brief description of the

purpose of the study, permission to record the interview via digital recorder was obtained and the informed consent form was signed. All digital audio files, field notes, photographs and transcripts are stored on a secure computer that is password protected and stored on an encrypted hard drive. The researcher is the only person with the passwords for the encrypted drive. As an additional measure of security the computer is also kept in a locked office when not in use. Printed copies of the transcripts are kept double locked in a secure file cabinet in the researcher's office. All materials are coded to maintain the anonymity of the participants. Additionally, all third-party identifying information was also identified by a pseudonym for "all people and places mentioned by the participants" (Hadjistavropoulos and Smythe 2001, pp. 168). The key for the coded names and is stored in digital format on the secure computer.

Whenever possible, the interviews were conducted face-to-face (Rubin and Rubin 2004). Most of the interviews were conducted with the individual participants in their offices at their respective institutions. Three of the interviews were conducted via telephone as a result of scheduling difficulties. At the conclusion of the interviews the digital files were transcribed in their entirety for coding and analysis by the researcher. During the process of coding and analysis the researcher sought to find patterns in the data collected. In such cases where patterns were found, the researcher did seek out additional instances in the data that would confirm or refute the initial interpretation a process discussed further in section four.

3.6.1   Informed consent

Initial contact was made with study participants in writing via a letter of introduction (see Appendix A). The letter gives a brief overview of the intent of the study and asks if the recipient would be interested in participating in the study by agreeing to be interviewed. Upon acknowledgement of an interest to participate the researcher made arrangements

to interview the participant at their location. Following Erlandson's recommendation that a "natural setting" is always preferred to a "controlled setting" (1993, pp.16) to gain a deeper understanding of the participant and the environment in which they worked. At the beginning of each interview the participant was read the "Informed Consent" form (see Appendix B) and the participant was asked to sign the document. As part of the consent the participant agrees to the recording of the interview via digital audio recorder and the retention of records related to their participation in the in the study (audio files and transcripts) for future studies. Consent forms for all participants are kept in a double locked file cabinet in the researcher's office.

3.6.2 Trustworthiness

In *Criteria for Assessing the Trustworthiness of Naturalistic Inquiries* Guba outlines the four components inherent to trustworthiness in qualitative research: credibility (see Table 3.4), transferability, dependability, and confirmability. Together these four elements work together to help insure rigor in qualitative research (Key 1997).

Table 3.4
Criteria for Assessing Trustworthiness
(From Guba 1981 Criteria for Assessing Trustworthiness)

Trustworthiness		
Qualitative Paradigm		Quantitative Paradigm
Credibility	↔	Internal Validity
Transferability	↔	External Validity
Dependability	↔	Reliability
Confirmability	↔	Objectivity

Shenton's research entitled *Strategies for ensuring trustworthiness in qualitative research projects* (2004) enumerates a list of fourteen strategies useful in ensuring credibility and trustworthiness in research. Each has been listed below and each including a brief

description and a notation on how they were used in this study or a note on why they weren't used in this research (taken in part from pp. 64-69).

Adoption of a well established research method – Erlandson's (1993) method of naturalistic inquiry was used in combination with Rubin's (2004) techniques for qualitative interviewing for this research. Numerous dissertations have been successfully completed using these methods over the past fifteen years and include the following: Sherwood (2001), Bloom (2001), Griffin (2000), Kinder (2003), McKinney (2000), Reed (2000), Rosebrock (1996), Therrell (2004), Boughan (2002), Hart (1996), Gruenwald (1995) and Shehayeb (1995).

Background, qualifications and experience of the investigator – The researcher began his involvement with the discipline of architecture as an undergraduate design student in 1991. He has been actively engaged in professional practice since 1995 and is about to begin his sixth year as an architectural educator. Over the past seventeen years he has become very familiar with many of the techniques and traditions of architectural practice and education. It is this "prolonged engagement" (Erlandson, Harris, Skipper and Allen 1993; Lincoln and Guba 1985) with both professional practice and education that has given the researcher the requisite information to approach this course of research and the shared background with each of the participants in the study that aided in the establishment of a relationship of trust between the researcher and the research participant.

Early familiarity with the culture of participating organizations – As established in the preceding section the researcher has extensive background and familiarity with the culture of architectural education and its relationship to architectural practice.

Random sampling – was not used as part of this study. The participants were purposefully selected based on their experience with collaborative methodologies and identified through literature and/or referral.

Triangulation – There are a number of types of triangulation that may be employed in qualitative research including methodological triangulation, data triangulation, and informant triangulation (Shenton 2004; Mathison 1988; Erlandson, Harris, Skipper and Allen 1993; Maanen 1979; Van Maanen 1983). The purposeful selection of participants did allow for the use of informant triangulation due to a demographically wide range of participants in this study (see table 3.3). Shenton (2004) notes that "triangulation may involve the use of a wide variety of informants…Here individual viewpoints and experiences can be verified against others…" (pp. 66) He goes on to say that "the sampling of a range of people in different organizations may be employed to provide the diversity" (pp. 66) a position further supported by Dervin who writes "the necessity of obtaining a variety of perspectives in order to get a better, more stable view of 'reality' based on a wide spectrum of observations" (Dervin 1983)

Tactics to help insure the honesty in informants – Each person solicited to participate in this study was made aware that participation was voluntary both at the time of initial contact and at the beginning of each interview. Each participant was given the right to stop the interview at any point in the process as well as the right to refuse any question asked without explanation to the researcher. Each participant was encouraged to speak frankly throughout the course of each interview. The researcher strove to develop a strong rapport with each of the research participants as a means of increasing the participant's level of comfort with the process.

Iterative questioning – refers to a method of question designed to uncover deliberate false statements on the part of the interview participants. This strategy is most often required when dealing with sensitive subject matter. This process involves the asking of the same questions in different ways to potentially uncover intentional false statements through the identification of contradictions. Shenton writes that "An alternative approach and one that provides greater transparency lies in drawing attention, within the final research report, to the discrepancies and offering possible explanations." (pp. 67) Due to the subject matter being addressed the researcher believed that likelihood of false statements was low. However, the iterative questioning strategy was used on a limited basis. The researcher also used Shenton's strategy where discrepancies were identified.

Negative case analysis – is used as a verification tool and as a method of demonstration rigor in qualitative research (Padgett 2003; Strauss and Corbin 1990). At the conclusion of preliminary analysis where emergent themes were identified each "case" or interview session was reexamined to verify that the properties of the emergent themes were applicable to each case. This process has indicated no anomalies or disconfirming evidence.

Frequent debriefing sessions – Numerous discussions with the researcher's committee was conducted throughout the course of this study in an effort to further inform this work. Shenton writes that this process allows "the vision of the investigator may be widened as others [committee members] bring to bear their experiences and perceptions… discuss alternative approaches… and draw attention to flaws in the proposed course of action." (pp. 67)

Peer scrutiny of the research project – see section 3.6.2.1 for a detailed description of how peer reviews were used in the course of this study.

The researcher's reflective commentary – throughout the course of this study the researcher sought to continually evaluate the research as it evolved through the uses of note taking, memoing and journaling.

Member checks – see section 3.6.2.1 for a detailed description of how member checks were used in the course of this study.

Thick description of the phenomenon under scrutiny – is described by Lincoln and Guba (1985) as a way of addressing external validity. Where the researcher describes a phenomenon in sufficient detail that the reader can begin to evaluate the extent to which the conclusions drawn are transferable to other situations, settings, people, and times.(Boyer and Mitgang 1996)

Examination of previous research findings – In addition to the many sources already cited this research has gained tremendous insight from dissertations by Cunningham (2007), Hunt (2006), Sherwood (2001), Poole (2008), Sturtz (2008), Bloom (2001)

3.6.3   Credibility

While validity in research is universally important it should be noted that the definition of what constitutes validity and how validity is addressed is dependent on the research paradigm in place. In a quantitative paradigm the positivist researcher addresses reliability in terms of internal and external validity. Internal validity as noted by Willis is concerned with reproducibility asking "If another researcher does the study again, will he or she obtain the same results as the original researcher?" (2007, pp. 216)

Johnson states that "when qualitative researchers speak of research validity, they are usually referring to qualitative research that is plausible, credible, trustworthy, and, therefore defensible" (1997, pp. 282). Guba (1981) favors credibility in lieu of internal validity when referring to qualitative research. For the purposes of this study credibility

was used in place of internal validity. There are a number of techniques that have been developed by qualitative researchers to address the issues of credibility as noted in the quote above by Johnson. The techniques that were used in this study to support the credibility of the research and lend credence to its dependability and confirmability include: member checking, peer review, research journaling and audit trails (Willis 2007).

At the conclusion of each interview the digital files were transcribed and then verified for accuracy by the researcher. Once verified the transcripts were sent as an electronic document to the interview participant as a "*member check"* to verify content accuracy. The participants were permitted to make note of any necessary corrections and they were also given the opportunity to expand on the topics addressed in the initial interview if necessary.

The next level of checking came in the form of *"peer review"*. Throughout the production of this research colleagues were asked to review the material and asked for critical feedback. Additionally, smaller pieces of this research have been submitted successfully for peer review and publication at national and international conferences. Shenton (Shenton 2004) notes that "feedback offered to the researcher at any presentation (e.g. at conferences)" (pp. 67) can be particularly useful.

Another useful tool for the qualitative researcher is "research journaling". The research journaling allows the researcher to document thoughts about the research being conducted such as documenting notes and thoughts prior to an interview; documenting additional observance after the interview; document thoughts and considerations during the process of transcription, coding and reporting.

The final tool used in this research to address concerns of credibility is the development of an *"audit trail"*. Most commonly thought of in the context of business or accounting allowing an individual the requisite paper trail to track all expenditures and verify that

there are no anomalies. The same principal applies in the use of audit trails in qualitative research. The researcher documents the entire research process starting with the initial conceptualization of the research to be conducted through final reporting. Allowing others to understand how and why the research developed in the way that it did. Lincoln and Guba identify credibility as one of the most important factors in establishing trustworthiness (1985).

3.6.4   Transferability

Transferability, also referred to as external validity in the positivist paradigm, can be described as a measure of generalizability asking "…to what populations, settings, treatment variables, and measurement variables can this effect be generalized?" (Campbell and Stanley 1963, pp. 5) When combined with internal validity the two (in the positivist paradigm) serve to allow the researcher to measure the statistical gaps between the groups or elements (independent variables) being studied. Willis notes that "The concept of validity and reliability are based on the assumptions that you are looking for universals — for laws — and therefore want to conduct research that is research that is generalizable and replicable." (2007, pp. 218) this is typically not the case in a naturalistic, qualitative or interpretative study such as this one.

3.6.5   Bias

As a qualitative researcher I maintain the position that bias is unavoidable in all human action including research. Willis writes that "Qualitative research rejects the very idea that you can be objective and neutral in research. You pick certain things to study because you have an interest. You probably also have an idea about the results and conclusions that you will end up with". (Willis 2007)

Peshkin (1988) advises of the importance of understanding your own individual subjectivities and the biases that they create. Through the course of completing numerous architectural projects, I have come to understand that all architectural projects are collaborative in nature, though the degree of collaborative interaction may vary based on project size, location and duration. It is also my experience that "collaboratively healthy" projects meet their deadlines and budgets far more frequently than projects that lack a "collaborative spirit". As an architectural practitioner I have had the opportunity to work with a number of intern architects who have recently graduated and witnessed the difficulty that many have in adjusting to the team environment of architectural practice. As a result I have penchant for collaborative teaching methods and believe that collaborative skills should be taught to all architecture students as an institutionalized part of their core curriculum. I have also spent several years as a design studio instructor experimenting with techniques for implementing collaborative methods into the design studio. It is from this position that I chose to pursue this course of research and I have attempted to remain aware of these biases throughout the course of this research endeavor.

3.6.6 The interview guide

The initial preparation for the semi-structured research interviews involved the development of an interview guide (see Appendix C) containing basic questions to be asked of each interview participant (Patton 1990). The use of an interview guide in a naturalistic inquiry helps insure that the necessary questions are asked in the course of the interview by giving the researcher a pool of questions to work from. Patton notes that the use of an interview guide gives the researcher structure, while maintaining the freedom to "explore, probe, and ask questions that will elucidate and illuminate that particular subject". (pp. 283) The questions contained in the interview guide should be considered the building blocks of the conversation that develops between the researcher

and the research participant. As part of that conversation the interview guide allows the researcher to ask the same questions to each participant while giving the flexibility for the participant to answer and clarify as they see fit. The intention of the interview guide is to provide "a framework within which the interviewer would develop questions, sequence those questions, and make decisions about which information to pursue in greater depth". (pp. 284)

The interview process typically included three distinct types of exchange between interviewer and the interview participant. The first was that of a structured research interview where a directed question was asked and direct answer was given without deviation on the part of either party. The next was more akin to a clinical interview where the researcher followed "the thread of meaning as they [interview participant] lead through diverse topics". (Levinson 1978, pp. 15) The last type is that more reminiscent of a conversation between old friends where "the relationship is equal and the interviewer is free to respond". (pp.15)

3.7   Data Organization and Analysis Procedures

Once the involvement of the interview participants was secured as described in Section 3.4 *Selection of Participants,* the researcher began the interview process. As mentioned in Section 3.6 *Human Subject Research*, eleven of the fourteen interviews were conducted on site and the remaining three were conducted via telephone. Each of the onsite interviews required significant travel and researcher chose to travel the day prior to the scheduled interview to allow adequate preparation time before the interview. As part of the preparation process the researcher spent an average of three to four hours rereading pertinent papers or articles written by the individual being interviewed and made notes that could be useful for the interview or analysis process.

At the outset of the interview and in accordance with the procedures outlined in Section 3.6.1 *Informed Consent* the interview participants were read the informed consent form and advised that the interviews would be recorded with a digital audio recorder. Each interview began with question one on the interview guide and were followed by the next question on the guide unless the conversation went in a related tangential direction that might bring greater meaning to the topic being investigated. (Rubin and Rubin 2004) The researcher made comments and asked additional ancillary questions as required to keep the conversation moving though it was unnecessary to intervene to keep the conversation on track. It was found that often the questions on the interview guide were answered in the process of answering previous questions. The interview continued until each of the questions on the interview guide (fourteen in all) had been addressed. At the conclusion of the interview the researcher explained the transcription process and that a copy of the transcript would be sent to them for review and comment.

The procedures followed in the course of this research and outlined below is based on the process used by Cunningham (2007) for his dissertation entitled *Becoming Men: The Journey of Irish-American Men* (pp. 91-92).

1. The researcher secured participants.
2. The researcher obtained informed consent.
3. The researcher engaged in the interview process.
4. The researcher transcribed the interviews and checked them for accuracy.
5. The researcher sent transcripts to the research participants for feedback.
6. The researcher followed Miles and Huberman's (1994) coding process (Table 3.5) and coded the transcripts.
7. The researcher developed a list of themes identified in the coding process.

8. The researcher reviewed the transcripts to locate appropriate quotations, and then selected the most appropriate quotes for inclusion in the study.

9. The researcher then re-engaged the results of the collected data with literature.

Table 3.5
Coding Procedures

Coding Procedures	
Data reduction	"refers to the process of selecting, focusing, simplifying, abstracting, and transforming the [raw] data" (Miles and Huberman 1994, pp. 11) "Data reduction involves making decisions about which data chunks will provide your initial focus" (Silverman and Marvasti 2008, pp. 220)
Data Display	"an organized assembly of information that permits conclusion drawing and action" (Miles and Huberman 1994, pp. 11) "It involves assembling your data into displays such as matrices, graphs, networks, and charts, which clarify the main direction (and missing links of your analysis" (Silverman and Marvasti 2008, pp. 220)
Conclusion drawing	"beginning to decide what things mean — is noting regularities, patterns, explanations, possible configurations, causal flow and propositions" (Miles and Huberman 1994, pp. 11)
Verification	refers to the testing of preliminary conclusions for "their plausibility, their sturdiness, their 'confirmability' — that is, their validity" (Miles and Huberman 1994, pp. 11)

3.8 Summary

The purpose of this section is to give the reader an understanding of the procedures followed in the collection and analysis of the research data. This section also outlines the steps taken to insure that the research is trustworthy, credible and dependable. It is also important to note that since this research involved human subjects there was great consideration given to the many factors surrounding the use of human subjects in research. This section also outlined the procedures that were followed that were followed to insure that the participants in this study were protected. In all research utilizing naturalistic inquiry it is nearly impossible to separate the process of discovery from the particular discovery itself. My goal in using this method was to allow the two to interact and create an intellectual environment of research that allows this method to be stopped by the object of the study and simultaneously allow the object of the study to be shaped by this method. This process creates a complex but richly rewarding research environment.

4   FINDINGS

This section provides a synopsis of the interviews conducted for this research. The material that follows starts by providing a general overview of the interview process and brief profiles of the respondents. Then the findings of the research are grouped into five overarching categories where the findings are examined.

4.1   Review of the Interview Process

The basic guidelines for this research were defined by the five overarching research questions found in section 3.5 of this document. These questions were expanded into the format of an interview guide that was administered to each of the interview participants.

The interviews (thirteen in all) varied in length from forty-two minutes and 6,900 words to one hour and forty-two minutes and 18,490 words with the average interview taking one hour and six minutes and 9,690 words. In all there was nearly sixteen hours of taped interviews that transcribed to 125,970 words of data. All but three interviews (Steve Johnson, Mark Jones, Fred Jackson) were conducted on site in the respondent's office, due to travel limitations, these three were conducted via telephone. Each interview was based on the same interview guide (Appendix C) and conducted in the manner descried in the methodology section of this document. Throughout the interview process a number of themes emerged and numerous potential threads evolved from the verbal interaction of the interviews. Despite the common interview guide, the range of material discussed with the interview respondents varied widely and the answers provided by the respondents took this research in unexpected directions that will be discussed below.

4.2   Profiles of the Respondents

Through the course of this research I had the privilege of engaging in an extended dialogue with a number of leaders in architectural and design education. The range of experience and expertise represented by the respondents is vast, including each of the academic ranks and ranging from those at the dawn of their career to those at the sunset. The motivations, areas of interest and previous experiences of the respondents were diverse and better than anticipated at the outset of this research.   The following paragraphs provide a brief profile of the individuals interviewed during this research.

Jim Smith – is a Professor, Associate Vice President, and Executive Director of a research center at a medium sized university in the Midwestern part of the United States. He has a Bachelor of Architecture and a Masters of Landscape Architecture and is a licensed landscape architect.

Tom Clark – is an Associate Professor and Interim Vice President at a medium sized university in the Midwestern part of the United States. He has a Masters of Fine Art and specializes in computer generated art.

Judy Wilson – is a Professor and Dean of the School of Architecture and Allied Arts at a large land-grant university in the northern part of the United States. She has a Masters of Architecture and is a licensed architect and maintains an active architectural practice.

Jeff Thompson – is a Professor and Dean of School of Architecture, Planning and Preservation at a large land-grant university in the Middle-Atlantic part of the United States. He has a Bachelor of Architecture and a Masters of Architecture. He is also a licensed architect and principal of a large architectural practice.

Bill Peterson – is a Professor and Dean of School of Architecture and Planning at a small private university in the Middle-Atlantic part of the United States. He has a Bachelor of Architecture and a Masters of Architecture and is a licensed architect.

Steve Johnson – is a Professor and Director of a research center at a medium sized university in the Midwestern part of the United States. He has a Bachelor of Architecture and a Masters of Architecture and is a licensed architect and maintains an active architectural practice.

Mark Jones – is an Associate Professor at a medium sized private university in the Eastern part of the United States. He is a Diploma Engineer in Architecture and has a Masters of Design and a Doctorate of Design and is the author of several books.

Fred Jackson – is an Assistant Professor at a small university in the Eastern part of the United States. He has a Bachelor of Architecture, Masters of Architecture, Master of Science and a Ph.D. in Architecture.

Arthur Phelps – is a Professor and Dean of the College of Design at a large land-grant university in the northern part of the United States. He has a Bachelor of Architecture and a Masters of Arts. He is also a licensed architect, author of numerous books and is the former editor of two major periodicals.

Sam Wright – is a Professor and Director of a small private art school in the northern part of the United States. He has a Bachelor of Architecture and a Masters of Architecture; He is a licensed architect, author and journal editor and recipient of the Rome Prize Fellowship.

Ted Peterson – is an Associate Professor and Director of Graduate Studies at a medium sized land-grant university in the southern part of the United States. He has a Masters of

Architecture and a Doctorate of Design. He is also a licensed architect and maintains an active architectural practice.

Joe Stevens – is a Professor and Architecture Department Chair at a small private university in the Midwestern part of the United States. He has a Bachelor of Architecture, Masters of Architecture, Ph.D. in Environmental Design. He is also a licensed architect with an active architectural practice.

Matt Connors – Is deceased. At the time of the interview he was a Professor and Dean of the College of Architecture at a medium sized university in the southern part of the United States. He had a Master's and Ph.D. in Urban Planning and was actively engaged as a planner in the community.

Roy Brown – is an Associate Professor and Associate Dean of the College of Architecture at a medium sized university in the southern part of the United States. He has a Masters of Architecture and he is also a licensed architect and extensively published.

4.3   Discussion of the Themes Identified

As previously mentioned the scope of material covered in the course of the interviews was varied and in cases went beyond the scope of this research. The extraneous data will not be incorporated in this research but is likely to be pursued in future work and will be discussed further in section five.

As part of the process of analyzing the large amount of data from this study was coded out using two-hundred and six distinct codes to classify the data. Through a process of gathering and refinement the large number of codes was categorized into five general themes: Levels of Collaboration, The Role of Collaborative Pedagogy, The Collaborative Skill Set, Implementation of Collaborative Methodologies and Collaboration in the

Design Studio. Collectively, these themes begin to paint a holistic picture of the collaborative design pedagogy and its use in architectural education.

4.3.1   Levels of collaboration

Each of the thirteen interviews conducted started with the same open ended question.

> Dating back to *Scholarship Reconsidered,* Dr. Ernest Boyer made a case for academic collaboration at several levels (administrator, professor, student, practice, community), a theme revisited in *Building Communities*. In your opinion, what role does collaboration play in architectural education and its reform?

This question was asked with the purpose of initiating a dialogue and framing the direction of the overall interview. While the initial intention was to investigate the role of collaboration as it related to administrator, professor, student, practice, and community, the interview respondents viewed these roles in a broader context, focusing on collaboration at the levels of community, institution, faculty and student. In examining the perceived levels of collaboration we will work from the macro scale of community, to the slightly smaller scale of college or school, then to faculty and ultimately to the micro scale of student.

4.3.1.1   Community

Service to the community has long stood a as a central value in many institutions of higher learning and this value is at the core of many schools of architecture across the United States. This characterization is most pronounced at the land grant institutions although it is found in differing degrees at all public and private institutions. There have been numerous high profile examples of architectural programs that have been engaged with their communities. Such as The Studio at Large (Palleroni and Merkelbach 2004) out of the University of Washington and The Rural Studio (Oppenheimer-Dean and Hursley 1998, 2002) at Auburn University. There are also many that have been less publicized

but impactful examples at schools of architecture across the country. Habitat for Humanity programs at universities across the country such as the one at Virginia Tech (Broughton, Doss and Moody 2000) are a well known avenues for public service.

In examining the role the community plays for schools of architecture represented in this study, the respondents were asked their perceptions of the importance of developing a collaborative relationship between their institution and their local community. The responses, generally speaking, fell into one of two categories, motivators for collaboration between school and community and examples of collaboration between school and community. Most of the respondents acknowledged a responsibility of the institution to engage with the community that it serves and many saw project based works as a vehicle well suited for the task.

In describing this respondent's perceived value of greater collaboration between the academic institution and the community that is serves, this description was given for why collaboration is important.

> It plays a couple different roles; one is that it affirms the value of shared enterprises and the idea that through shared enterprise greater potential resides between and among people than as independent agents. So, in creative and politically sensitive processes and issues that shared enterprise really affirms. Community affirms the interconnected web of human kinds bonds together. So that's a core value that gets affirmed by successful collaboration. (Thompson 2005)

While discussing the need for greater community involvement one respondent noted that it was critical to engage the students in community based activities as early as possible stating,

> As future professionals, they're involvement with the community, it starts here. Because if it doesn't start here, it doesn't happen; everybody is recognizing that in our business, you can no longer go it alone. You can have locally undesirable land uses and citizens can kill a project. They can

also enhance a project, so learning the skills of how to interact, how to listen, how to responsibly respond to citizens questions is terribly important (Connors 2005).

Another respondent built upon this saying,

here is a place for bridging to society or service and that there is actually, I have always felt that there is an ethic that gets communicated through that process that we don't want to overlook at all and it's that you've got to give something back (Clark 2004).

In addressing then need for greater collaboration with the community and the value that the student derives from this form of interaction another respondent said

I think another important dimension to this is the discovery that others pull, insights and wisdom and other points of view that we don't hold as individuals. And that understanding what an access others hold, and more to bring them out, to lift them from holding it, rather, making it public, putting it on the table, making it part of an exchange, really affirms the value of individuals, not just parts of a community but individuals themselves (Thompson 2005).

Each builds on a theme addressed in Building Communities, where Boyer discusses one of the professors interviewed for their study. Say that he "teaches students the importance of group dynamics, interviewing, and listening skills in developing designs that respond to human needs". (1996, pp. 39) As the students learn to interact with the greater community they begin to adjust to the role that they will assume as architectural practitioners.

Another theme visited by Boyer in Building Communities with his *Seven Essential Goals* for the profession is the need for greater *Service to the Nation*. This is a call for greater involvement by architects in all levels of society from the neighborhood to the state house. A theme reiterated by one of the respondents who said,

I believe this profession's salvation lies in one area, and that is a re-engagement with the civic arena. This country is falling apart from

> disengagement. And there really is one profession that actually understands the civic arena better than a lot of other, better than almost all - not all, but better than almost all professions. And politicians really understand it too, but professional politicians (Wright 2005).

A position shared by Ambassador Richard Swett (2005) who recounts the historical role that architects have played historically in the developing civic and political backbone of the United States. In responding to the question, 'why are designers well equipped to be leaders?' Swett points out, "they design not only buildings and spaces but also healthy relationships and positive experiences". (2005, pp. xvii) The community engagements described below offer a real life laboratory for learning how to build these sorts of relationships.

Each of the interview respondents point to ways in which their programs and/or institution was actively engaged in community collaborations. In some cases the collaborative role is focused on the collaboration between the academic institution and the community it serves.

> Being with community is terribly important for us because we look at the local region as our laboratory, so all of our studios, all of our workshops somewhere working on a project is a new initiative that the city and now the state… which is called the Beltline which is an old railroad track… that circles the inner parameter (Connors 2005).

As with the previous statement, many of the interview respondents view the 'community' as the city or town in which the university or college resides. Another respondent reflected on a recent community based project stating that

> we've worked with the farmers' market coming up with alternative models for structures, for distribution, for mapping, for shelving, for storing, for shipping, that our students in first year, who are these group of students that come from multiple disciplines, can bring to the community (Wilson 2005).

Some of the urban based programs are deeply entrenched in the inner workings of the architectural workings of their city as described by this respondent,

> We're all involved in a number of boards on the Metro Chamber of Commerce, with the Central City Congress, ULI, design review commissions that are going on. We've all been asked to chair blue ribbon committees to do more…, and it's all terribly important and we get our students involved (Connors 2005).

Though the 'architectural' project for a 'client' within the community was common amongst the institutions represented, there were others that also sought to use community based collaboration an outreach and recruitment opportunity. A respondent described an annual event held at the School of Architecture.

> We bring the students to the college here to do charrettes with our students which is really an opportunity for inner city kids to both learn something about architecture and design as well as to see that even if they don't go to these fields that they can come on campus that you know could image themselves being college students. So it's really an effort to introduce them to the idea of being a college student when they may come from families that have never had a college graduate (Phelps 2005).

It is this type of work that begins to answer the call that Boyer (1996) made when he articulated the need for 'An Enriched Mission' amongst architectural programs nationwide, saying "that architects could be more effectively engaged in society's most consequential problems? Most essentially, how might schools themselves add knowledge and clarity to that mission?" (pp. 33)

Other institutions see themselves as the catalyst of collaborative endeavors within the community saying that "we see ourselves as kind of instigators of collaboration out in the community" (Phelps 2005) This philosophy is one way to step beyond the idea that community is limited to the city or town that the college or university is part of another said,

> We have been active in just about every county in the state in various ways. We have a metropolitan design center that's been very active over the last twelve, thirteen years with communities and then everything from sort of traditional urban design to sometimes fairly radical things. Like getting community to collaborate among themselves for example we put seven suburban communities together where they all had some of the same problems and they weren't talking to each other. So the university got them to sit around the table and share information that reduced their costs. Which they wouldn't do independently, but if the university stepped in we have enabled them, gave them the kind of latitude to talk. And now they are all doing everything in collaboration on their own (Phelps 2005).

There are some that were interviewed that view the idea of community in a broader context. This same respondent also noted that,

> We have taken our land grant mission and have gone global with it. These are not only the right thing to do but they are also incredible opportunities for our students and as well as ways to diversify our revenues streams (Phelps 2005).

Their work has focused heavily on traditionally disadvantage populations including Native American populations within their region. This respondent recounted work done on a Native American reservation.

> We did a project with a native American community where teams of students worked with native Americans to develop, using a kind of native American technology in imagining what it would be like today if it had continued develop over the last you know hundred some years (Phelps 2005).

In describing this how the community based collaborations had grown to include the 'global community' this respondent work done with charitable or global relief organizations

> sometimes our collaborations go really far field I just got back a few weeks from Paris where we signed a pilot agreement with the World Heritage

> Council with UNESCO as the first university to start to work with them on the development of World Heritage site nominations around the globe. We have been doing this work in Venice, Portugal and faculty members have been very active in Asia and South America and we have given ourselves four years to get a few pilot projects going or we will be um working on World Heritage sites that range from the Silk Road with the Chinese government… working in Dhaka in Bangladesh and UNESCO serves as the kind of broker that introduces us to state parties to the countries that could use our expertise and our technology and then graduate students and faculty then work on these projects moving them along to a point where the countries then can nominate them as World Heritage sites which then have all kinds of economic benefits to the country. We have been working in Venice on their lagoon issues, we have water because we have a lot of [expertise] particularly in or department landscape architecture a lot of people with water expertise and Venice has a lot of water problems, sinking city and abandon islands (Phelps 2005).

The global view of community has the ability to dramatically increase the sphere of influence of the institution and through collaboration with partner institutions the level of impact that the institution can have grows significantly.

There was also the belief that despite the rich and positive work that has been done there was still room for growth as noted by this respondent,

> I think there is a real opportunity there for the community based projects heritage that we have in the college to be expanded (Smith 2004).

The potential for community based collaboration exists at many scales and the potential for growth in this area is outstanding. There is significant pedagogical and social value in this type of engagement and as noted above is being pursued in many ways.

4.3.1.2 College or school

Through the course of the interviews it became apparent that a critical factor in pursuing an agenda of collaborative engagement was "buy in" at the institutional level. Each of the respondents spoke at varying degrees about the importance that this played in

establishing a culture for collaboration. This section looks at the role that the organization plays in affecting a spirit of collaboration then follows with examples of collaboration at the level of the institution, be it a department, a school, a college or a university.

There were a number of observations made by the respondents of this study on the role the organization plays in affecting collaboration at different levels. One respondent interviewed early in this research made the following observation about collaborative initiatives in the class room becoming more institutionalized within the organization.

> …the second level is organizational, and you have to have that in order to have ongoing impact and ongoing evolution you have to have institutional buy in. I think that one thing to do something that is experimental a one off of an innovation that your just playing around with as an individual faculty or several faculty it's another thing to say to the powers that be, to the dean, "we would like to see this as a part of our core curriculum or we would like to see this as standard elective offered every year" and that means that the chairs have to be on board, the dean has to be on board, and that there has to be some kind of connection back to broader core values that you can give lip service to. But really when it comes down to it as a dean you only have two or three real main ideas that you consistently can hang things off and that everybody can build from so that's got be in there in that core value (Smith 2004).

As this respondent notes, each of the hierarchies of power come into play when attempting to institutionalize an alternative pedagogy and there is a need for consensus building between the various hierarchies in order to effect change.

Another respondent made the observation that the lack of collaboration, interdisciplinary or otherwise, is typically limited to the teaching side of institutions and does not represent the research side of the equation. This respondent notes that,

> we are a much more integrated, interdisciplinary in research than we are in instruction, and that's largely because of the centers and the fact that there still are powerful incentives for people to collaborate which basically is money (Connors 2005).

This is a point that was supported by nearly every respondent in this study. There is a widespread effort on campuses across the country to increase the amount of collaborative research being performed, with a particular emphasis on interdisciplinary research. The reason for this upswing in the amount of interdisciplinary research as indicated above is funding. Funding agencies have found value in collaborative research endeavors and are giving financial incentives for doing collaborative and particularly interdisciplinary research.

This continues to stand in contrast to the teaching side of many of our academic institutions. This again, has a great deal to do with money and the resulting structure of many organizations. As described by this respondent,

> …the whole idea of unifying is a complex one because essentially its educational institution is a variety of territories, its different heads running their own territories and the thought of whenever an administrator speaks to unifying and collaborating and going across to institutes across campus or whatever the complexity begins, who should use the resources, who is in charge, who is going follow what, who is going to do all of those kinds things… I think as an administrator and how you structure so you limit that, and get to the objective, and frankly it's a lot about assessing the situation and determining what's the best approach to get in the end what you are looking for (Smith 2004).

This respondent points to the importance that consensus building plays in developing a spirit of collaboration at the level of the institution. With many leaders guiding their respective 'territories' it is critical to find a common ground or cause to build upon and thereby serving as the foundation for collaborative engagement. This common ground is often monetary.

Another respondent also commented on the roll that funding can play in such efforts,

> In this day and age, the buzzword around universities is all collaboration, and interdisciplinary. The more we can get different groups working

together, the better, because that's what the federal government is saying in the distribution of funds, as are some of the industry sources as well. Sometimes that can be terrific to house any project. At Massachusetts Institute of Technology they are looking at the future, how they will do this, that, and the other, as a completely interdisciplinary effort, and it's very successful. So it can have great affect. So it can work out that way. But there are university structures in place that discouraged interdisciplinary study and discouraged collaboration. There's no question about it (Wright 2005).

This respondent builds on this same idea but also points to that lack of an intermediary hierarchy as a potential difficulty in trying to establish collaborative relationships stating that,

Academia, by and large, is a knights' of the roundtable situation where there may be a chair of a program or a dean or an associate dean, whoever it might be, looking a lot over the curricular issues or whatever. But beyond that, hierarchy is almost zilch. There's, of course, the difference of tenure between faculty members. But still, the rights of academic freedom, etcetera, set up a kind of balkanized curriculum almost by default and all these neighboring little city states, it's like Florence in the 15th century. These neighboring tiny little Papal States or something they are all brokering around with each other. And there's no, again, intermediary hierarchy (Peterson 2005).

Many of the respondents that held administrative roles at the time of these interviews noted the importance of their role in facilitating collaborative interaction between their organization and other organizations and acknowledge some of the difficulties that are faced in doing so.

…at the upper administrative level I don't see there being a lot of bridging being done by chairs and the associate deans and the deans need to say "Well let's find some areas that where we can collaborate"… It comes down to the tone that is set administratively. … And the answer is it runs in cycles, it's a pendulum a lot of it comes down to statement that can be made by deans and chairs and others who have set over arching charters and some of its in the trenches (Smith 2004).

Another respondent points to the structure of the academy itself as an obstacle to be addressed.

> It's much more challenging because of the organizational structure of the academy. So we're working very hard to bring a unique paradigm on design education in a built environment. It's much more influence than we've had historically… Those are the kinds of things that have to happen, not just once. It has to be a continual sort of dialogue we create as opportunities (Connors 2005).

The same respondent also noted that as the leader of a unit within the university structure there is a responsibility to be an advocate for the students and faculty within the unit to create opportunities with other units across the campus.

> I think universities are very political. They're inscrutable from the outside. It's important that our students and our faculty are deeply respected by other units in the University. Part of my job is to ensure that that happens. And that the work that they're doing is communicated throughout the university (Connors 2005).

This respondent pointed to an example of how collaborative initiatives implemented telling of a meeting that brought together two of the largest college on his campus. This also begins to allude to the role that technology is likely to play in collaborative endeavors.

> Right before the holidays the dean of our liberal arts college and I got all of her school chairs and all of our directors together for a half day talking about collaboration. What are you doing of interest to one another? …the cross-cutting thread is technology. …we must go outside the college and get the collaboration really where it is essential in to other areas whether it's engineering or sciences or liberal arts (Connors 2005).

In a later part of the interview this same respondent points out that many of the most successful ventures are the result of discussion that occurs over unofficial channels. Saying that,

> A lot of that happens by kind of sidebar conversations, deals that are struck within the institution (Connors 2005).

In discussing the need for greater interaction between departments across the campus this respondent noted that issues of territory need to go by the wayside and more credence needs to be given to where the greatest value can be found.

> I don't care who teaches it. As long as it meets our qualifications for what it is. So for instance, if we begin to teach a course in real estate development, in the architecture school it's actually better than what we teach in the business school, I'm delighted that we're flooded with business students (Wright 2005).

Many of the respondents noted that the opportunity for collaborative interaction between the disciplines of architecture, landscape architecture and planning were outstanding, due in large part to the large number of disciplines that were touched in the course of caring out a typical project in the built environment. This respondent notes the opportunities for interaction with business.

> There's collaboration with finance and the legal community, recounting the finance, mortgaging, all dimensions that involve - insurance - all the things that are involved in creating and sustaining a built environment. In the business world we handle it differently in different situations. For example, building construction, it's a deal that we've struck with the college of management that our building construction majors will take certain courses and then management majors will take certain courses (Connors 2005).

Other institutions have found it more difficult to initiate these sorts of collaborative relationships outside their own college and as a result have tended to focus collaborative efforts within their own unit.

> …we wanted to collaborate with engineering and we have tried of course, but we've been more successful collaborating between the two disciplines inside the college, which is architecture, landscape architecture. Although even that can be a challenge and I think there has been a sense that from the faculty that they take the students all take some of their first course together so they all have certain kind of base courses that are the same

>and then they really both branch off and then don't do that much together in the middle part of their education. (Phelps 2005).

The respondents in this study also discussed some examples of their firsthand experiences with collaborating at the level of the school, college or institution. This respondent noted how fragile these relationship dependent endeavors can be. This also points to the value of institutionalizing these approaches while also noting the difficulties that can arise from ad hoc collaborations over time without a structure to allow for change.

>And what's happened in our institution is that the philosopher died like that, just happened, you know, and three months later we have no person who is the champion for humanities. Our engineer went up the ladder and is now, you know, program director at NSF, and so he's not here. Another got frustrated with everything that was happening on the campus because of certain administrative, you know, whatever, and then there's one person left, you know, here. And there's other people it's become a political contest; let's try and figure out how we hold onto this diamond, which we all realize is a very valuable thing... So one of the reasons why we applied for that grant was to figure out how do you set the base for people to understand each other's language, and support them? (Wilson 2005)

Another respondent noted the opportunity for interaction with students of other disciplines by creating courses that allow non-design majors to take courses within the design schools.

>we have started a design institute that offers a design minor so that students for example in the architecture program can do a minor in graphic design or a minor industrial design or a minor in some other design field so they get to you know take courses in these other fields become somewhat conversant in (Phelps 2005).

This same respondent added,

> I feel that through collaboration and through partnerships and alliances you can take a college like this which is the smallest college in a very big university and ride in on their coat-tails go in partnerships with much more powerful players helping us find money and so it's a kind of there is kind of economic strategy behind it too. Which is diversification. (Phelps 2005)

By formalizing the collaborative relationship between design departments and the greater student body new collaborative bridges are developed with each new group of non-students that are ushered through a open elective or core curriculum course. The bridges created also have the potential of extending to faculty in other departments by way of their students taking these courses.

4.3.1.3   Faculty member

Collaborative endeavors at the level of the classroom are based entirely on faculty action. Regardless of community and administrative directive, collaboration is ultimately initiated and carried out in the classroom under the direction of faculty that is motivated to do so. This collaboration can come in many forms including small group collaboration, large group collaboration, disciplinary collaboration, interdisciplinary collaboration, co-teaching and many more possible variants. As the interviews for this study transitioned to the role of faculty in collaborative endeavors the comments generally fell into two areas, facilitators of collaboration and examples of collaboration among faculty members.

In an attempt to gain additional understanding of the collaborative action in the classroom the respondents were asked if they could describe the traits of a faculty member that was interested in engaging in collaborative exercises in the classroom. This respondent the core elements that he felt was necessary for faculty to facilitate collaborative engagement in the design studio.

> I think there is a way in which you can take a common belief or critical insight and run it across lots of different platforms and carry it into lots of

> different contexts. As a teacher, it seems to me, again paramount, successful teachers are the ones that expose those critical concerns, they don't conceal them, they expose them, as if it is kind of confession at the beginning of a studio. It's a hypothesis and everyone is invited to engage critically. The process is really both, it's a, the suspension of disbelief on the part of the students to say, you know we're going to try this, were going take that, even though that hypothesis is not my own, who am I to say whether its right or wrong, hypotheses more often its plural, but I am going to suspend judgment until I've experienced the practice of it and we have experienced it together. But, a faculty member that does that, and opens the entire process to a kind of critical reflection including the work at the end and is comfortable with a cross-section of reactions and impressions about this. In the studio, I think some of the best studios are where the debate continues through the last review about whether some set of hypotheses were worthy. I think you get much more meaningful learning and I think it is a much more honest reflection of what actually is going on in the discipline and in the world that our discipline serves. (Thompson 2005)

This respondent notes that transparency of process can be critical in the studio environment and encourages students to try new things. This can also be true when considering alternative teaching methods such as co-teaching where the teaching responsibilities are shared between instructors. Another respondent noted that when looking at co-teaching it more about the interpersonal relationship between the instructors than anything else.

> I have learned in tons of settings that were collaborative over the years that it's still simplistically comes down to individual chemistry and my best collaborations have always been when I really wanted to work with somebody… (Smith 2004)

This approach also has the added benefit of providing a working example of collaboration to the students.

The respondents were also asked how they go about encouraging their faculty to use collaborative methods in the classroom.

> I like to encourage faculty to expose their pedagogy to the students in the studio. This is what I believe what I believe about process, this is what expect about outcome. Here by the way is the literature on intellectual abilities, you know learning styles, the fact that people, every persons mind depending on environment, genetic predisposition actually works differently and educators have shown us this (Thompson 2005).

Another respondent noted that much of material we were discussing ran contrary to the type of person that goes into teaching in the first place and felt that this presented a substantial obstacle in the advancement of collaborative methodologies.

> Often people who go into academia go into academia because they're mavericks, and so you want team players, you've got to go to industry (Wilson 2005).

This position was countered by another respondent who felt while that may have been true at one point it didn't represent the new wave of people entering academia stating,

> Many of our architecture faculties for example have other degrees as well as architecture degrees. Increasingly what we're doing is looking for people that have those qualities, because if you don't have them they can't bridge. In urban design it's absolutely critical that you have expertise on the faculty and an individual faculty member that can deal with the micro skill of the architecture view and the macro skill of regional planning (Connors 2005).

This respondent goes on to say that they were actively seeking opportunities for making dual appointments of faculty members between two departments as a method of further encouraging interdisciplinary collaboration.

> We do a lot of joint appointments, many of them on initial appointments. We probably have joint appointments with every college on campus. Science and psychology and applied physiology. Applied engineering and mechanical and industrial systems engineering, business, management and we now have a college which has the public policy school. We have two or three of our faculty back there in the joint employment with the public policy school (Connors 2005).

Another point made by one of the respondents was the role of "alternative" faculty members can play in bringing collaborative experiences to the classroom. This particular respondent described the notion of using clinical and adjunct faculty in a more widespread manner to expand the scope of experiences offered to the design students and incorporate the real world office experiences into the classroom.

> …there are clinical faculties. Those are practice based, but regularly teaching every year, at least once a semester, and sometimes every semester. We have some on faculty here who should be the part of the clinical faculty…
>
> Then there are the adjunct faculty, they come and they are part of your local community, most likely. But they teach on a regular basis, or their relationship to the university is irregular, but constant. You know they're back and forth. They might teach once every fourth year. They may lecture. They may run a little studio or seminar thing in their office, but they're not like a clinical faculty member who goes to faculty meetings on a regular basis.
> And then four business people coming through here, and then they are rotated out after that, for two years or three years, whatever the term that we come to agree upon (Wright 2005).

The faculty member is the primary agent of change, both in and outside the classroom and the environment that is created is a critical component of a successful collaborative experience. Equally important is the 'collaborative example' that the faculty can offer the students in situations where co-teaching in a possible method of implementation.

4.3.1.4   Student

When considering the incorporation of collaborative methods into the education of architects it is also important to consider the students that will be taking these courses and their predispositions to these techniques. As part of this research the respondents were asked about the students that pursue an architectural education. One of the

respondents started this part of the discussion with a few questions and then followed with some additional comments.

> Who self-selects into architecture? And when you think about the 17-year-olds who are coming in, are they coming in because they're good in math and science, which is one cohort? Are they coming in because they like studio culture, another cohort? Are they coming in because they just like to make things, another cohort? Of those three cohorts, are any of them going to be leaders in cross-disciplinary efforts, or is that - we haven't even started to attract - where are leaders going? (Wilson 2005)

When considering the students that are typically attracted to the design professions this respondent made this observation,

> I think that the students who are attracted are the same students that were attracted 20, 50, 70, 80 years ago, and they're makers, but they may not be social mavens… So we're going to constantly attract the same students, and if we attract a little bit different student, they'll be gone after a year anyways so they'll melt right out, because they will not fit into this. When we have students who are great public speakers, or very involved with student council, they often are not our strongest students in architecture, and we run them off. And yet they will be our greatest advocates when, you know… it's very interesting. (Wilson 2005).

Another respondent made the observation that they felt the typical student had in fact begun to change and pointed to the leaders of some emerging young firms as examples of that fact.

> So this is a new generation of people who, I think - and interestingly enough - that group of people who… was an MBA prior to going to architecture school, a couple of engineers, some with a masters degree in literature.

> These are people whose backgrounds are very multidisciplinary, all with an architecture degree, but very multidisciplinary backgrounds first. Then they had architecture school. Then you went to architectural school. They all had private lives that were set up. Then they went to architecture school.

> So there was that worldliness first, so that when they got into architecture school, they were like you, you're the one. It's you, it's you, and it's you. And they kind of went, why, thank you, no. So, no it's not. And there are other firms that I know that are like. These are the firms that I championed in Architecture Magazine because they provided a different model of graphics.
>
> And the model goes to the question you're asking now. How do we change this notion? It's going to take a fundamental shift so the people understand that it is not about you or me. It is about us, or them. It's a group effort here. As I said before, there has to be strong, independent decision-making training to train future designers in making decisions. There has to be (Wright 2005).

As pointed out by this respondent, the multidisciplinary nature of the new wave of graduate architects is beginning to redefine the practice. This trend towards multiple degrees and a broader scope of focus by students offers fertile ground for developing formalized interdisciplinary opportunities for design students.

Some examples of the type of shift mentioned above include this description of a co-op program at one of the participants' institutions.

> We have a co-op program for the graduate level which is really quite successful and firms, both private firms and public agencies can purchase a student to work 13 hours a week in their office. They pay about $10,000.00 and the student gets tuition or admission. We probably generate something like $300,000.00 a year supporting that co-op. and the students are the greatest investors we have (Connors 2005).

This sort of program create a new synergy between local practices and the school of architecture as well as exposing the students involved to the highly collaborative nature of architectural practice described in other parts of this document.

4.3.1.5   Summary of levels of collaboration

As previously mentioned, discussions with the respondents revealed four levels of collaboration that exist at the college or university, including the community, the college or school, the faculty and the student. When conducting collaborative exercises in the classroom requires two or more of these levels of collaboration working in concert to achieve a positive outcome and can occur in nearly any combination. However the most common are student/faculty or student/student. In community based design studios, a third variant of student/faculty/community is common.

4.3.2   The role of collaborative pedagogy

As the interview progressed the research respondents were asked to consider that historically the education of an architect has been very singular in its approach, focusing on the individual, with little or no emphasis on collaboration, disciplinary, interdisciplinary or otherwise and to the juxtapose that against the realities of the profession that these students will enter, a profession that is highly dependent on the ability to work well with, as well as lead, others across a spectrum of disciplines. Then they were asked how they might reconcile this apparent gap without putting at risk the many strengths of the traditional, often highly individualized, architectural education?

One respondent responded that,

> Architects will all say they work interdisciplinary when they get out. They work with contractors, they work with developers, they work with zoning ordinances and blah, blah, blah, but our education is very myopic in some ways (Wilson 2005).

This same respondent continued by noting that our design faculty, speaking globally, is failing to respond to the changing needs of the profession.

> They're [design faculty] not bringing the ability to change to the way that they take the job, because ten years from now there will be a huge

change, and we have to be educating our students to be agile (Wilson 2005).

Another stated that,

> If you look at society itself I would venture by now that we are moving toward a more collaborative environment in society (Smith 2004).

Yet another respondent made an observation that perhaps architectural education has become too focused over the past several generations and perhaps this notion of greater collaboration permitted for the opportunity to be more of a generalist returning to the historical roots of the profession.

> It raises a question, are we becoming more specialist or should we be moving back towards the renaissance man and it's easy to point to renaissance man and say gee wasn't that a romantic era? When there was no architect, landscape architect, or city planner that you were a designer and you absorbed it all and you spewed it back out in these wonderful designs… But it's like I don't know on the one hand I value the specialization on the other hand I abhor it, because I do think or I believe in holistic approach to things and yet there is so much information that you have to download, I don't know how you do that and do service to the topics when have this much. So much information to grab, and still generalist, and still be someone who is holistic, and can practice and have experience… (Clark 2004)

This respondent raises the question, what sort of student do we need to be graduating to address the challenges of tomorrow's architectural practice?

The respondents were then asked for input on how collaborative techniques might be introduced into the design curriculum.

> I think that anything that you look that cause's substantive change has to have several things that lend it momentum. I don't think you can just say this is a good idea and everybody ought to go do this I think there have to be other compelling reasons that they get on board and some of those are structural one, organizational ones where I think that it's just going that

> way any way all you are doing is educational process that says here is an opportunity can we think about option can we put our heads together and your trying solve this I'm trying to solve this maybe collectively we have a better over arching solution. So that's one practical thing that comes to mind (Clark 2004).

One of the research respondents noted that the severe congestion of the accredited curriculum made it extremely difficult to add any additional courses to the curriculum or to pursue a dual degree with architecture and some other major.

> …with a transformative moment, there might have to be a very different way of thinking of architecture. What would architecture and public policy be up there, if you came in as a hybrid degree? But we've created our curriculum in such a way that you cannot take anything like that (Wilson 2005).

Going on to say,

> You can't take dual degrees of architecture in most of the schools in the country. You can barely play hockey once a week. That's another problem, you know, the kind of 24/7 criteria that we've laid on there (Wilson 2005).

Another respondent notes that the current structure increases solitude rather than developing collaborators.

> It doesn't have to remain that. And unfortunately, the way we have set up architectural education in this country, that solitude is enforced from the very, very beginning, and it grows. So that by the time architects get out in the real world, as it were, although I consider academia a real world involving millions of people every day in this country (Wright 2005).

Others pointed to the current structure of the degree making the switch from a five year professional bachelorette degree to the increasingly more common four year bachelorette and subsequent two year professional masters degree and the ability to expand the breadth of our curriculum.

...the four plus two model that seems to be proliferating. If you get a four year undergraduate degree that is not as focused on architecture... the pressure isn't on walking out the door and being able to take a registration exam. It is more about creating a base of operation and it's also more about creating a base that should you decide, because you now have the option of not going on into the masters into the accredited part of the degree that you have the ability to move into some other field and you have the ability to make a contribution back into society...(Smith 2004)

Others had thoughts on the way that the design studio courses are taught in a design curriculum and how they might be modified to better accommodate today's educational needs.

I think also we need to become more flexible about this idea that we are giving studio anywhere from a third to a half of your load and two thirds of your life, has got some potential to be reconsidered. I think that some of the work that Cincinnati has done, they're not alone but perhaps the longest standing, pioneering curriculum of alternating study with practice allowed certain questions to live in different contexts. It allowed certain skill sets to be experimented with in the different contexts, not just always the academic context is one way to address this.

Another would be to take and treat studio as a fulltime effort in some semester and other kinds of research and scholarship work to be fulltime other semesters. There's no magic to this idea that it is a continuous layer that has to be treated in the way in which it is treated in the curriculum and that's fine. I am generally supportive of faculty educators who are interested in experimenting with these models and breaking the back really of the... the backbone of this mythology about this simultaneous presence of design every semester and that its ever-present nature is a place to pursue, synthesize the other learning that is done in the curriculum. I don't think of it as a kind of theological truth or a sort of transcendent and higher value (Thompson 2005).

As pointed out, the demands of the studio based education can be very demand on resources and in the commitment of time on the part of the student. The Cincinnati model mentioned does offer an alternative to this approach by creating a model that is

more analogous to the clinical model used in medical education. By sharing the teaching demands between the university and practice there is potential for a more rounded experience.

This respondent offers another approach by discussing the implications that gaming theory might have when teaching in a design studio setting. He points out that in gaming there is often the need for both individual and group interaction in the course of the game and points out that this process might be successfully applied to the design studio.

> There has been a lot of work done over the last three decades on gaming theory and strategies of how it is that people both contribute individually and work synthetically together. Games for a long time have understood them, why are we drawn to games? Because they are frankly a combination of individual action and collective experience and one that the outcome is, in the best games, the outcome is not known or either controlled, it is alchemical in a way. It becomes enjoyable at the same time. So, there are paradigms, process paradigms which have a lot to teach us and I think the better teachers have explored those paradigms in the context of studio teaching. Myself, I've done things like established a game board for a mythical cities and we have constructed histories through a truncated process of action and reaction in order to simulate a century long period of time in a town in a kind of condensed way to understand that fourth dimension. The time influence on the roll of collective action on a common field and help student understand that the slice that they are working in as architects are very much a part of what has been for a long time. And should be understood as influencing factors and in fact a kind of collaboration by engaging the phenomena that has preexisted your own actions and begins to project beyond that to imagine what other consequences will be confronted… because it is a field of time that you are operating on now not just a field of space (Thompson 2005).

This same respondent continues by noting the importance of applying learning therories in the design studio. Since design faculty aren't typically trained in a formal way as educators this is often not a methodology pursued in the design studio.

> People learn differently, people have different ways of understanding everything from orientation to color. Were not even confident that we understand color the same way together so perception theory and theories about learning are very rich and dynamic and if you start with the evidence in the field that this is a reality therefore how do you turn this reality into something larger and more powerful it inevitably has to come from collaboration, it has to come from interaction, meaningful interaction and group work (Thompson 2005).

Another respondent picks up on these thoughts noting the importance of balancing collaborative and individual work in the studio.

> So all of those times where we read about studios, wherein they say, well, for three weeks we're going to work as a team. And then, the rest of the time you're on your own. Every studio should be something with a team experience in some portion of it. Not the whole time, there is a place for it, and a requirement for people to learn to generate ideas on their own (Wright 2005).

In an effort to quantify some of their experiences one of the respondents added,

> We just did a survey of our freshmen class about a number of these issues. Their world view has been expanded. If you come in and you're an architecture student, that's it. You develop that frame of reference of architecture, what architecture is, what's important, what's valuable, what's not valued. These kids after they finish the first year, they have been exposed to the language and role of a variety of disciplines. So whether or not they come back together is probably less important than having that basic understanding that when they go in to graduate schools somewhere else, their mind has been expanded. That goes beyond definition of a graduate (Connors 2005).

Getting beyond the structural issues of design education and the design studio in particular, there were a number of comments concerning the use of collaborative techniques in conjunction with design education. One respondent noted that the perceived role that a particular degree plays in the larger context of society has played a significant role in the way that design has been taught and notes that this can be different based on geography.

> In Latin America the architecture degree is seen differently in the schools and it becomes more of the facilitator and it's in many cases the degree of choice as to move into government and other places as with here it's a law degree. Well that tells us something about our society if that true. Because the law degree by its nature is very anal and very much about interpreting this fact versus that fact and about litigation where as theoretically somebody who came from design background who is also groomed to go out and deal with society and lead society would be much more creative and innovative. And I think again this is you know genius, you know it's probably not universally true for everybody who has gone this route, but there is a case to be made that he, because of his design background made a better leader and that environment was able to kind of help them think their way and plan their way into a new future and its very successful city in my opinion now as well a state also succeeding. So is that a direction that we got to be paying attention to and is in fact a big window open for us to step into. A new kind of role in society in western society particularly as the facilitator, bridger, whatever you want to call it. What does that mean for education, I think it means that we have become even more generalist, become even more knowledgeable of other things? Is that a role society will pay us for? I don't know I think that's where we would have to find some common ground with the processes that ignore us currently. The developer, the contractor, the others that are doing things without built environment designer per say. The engineer that builds, I think we would have to recast ourselves (Smith 2004).

This respondent points to the role that a collaborative approach in the design studio can play in redefine what an architect is in American society and how the architect can make a noticeable and lasting impact beyond built form on the landscape.

4.3.2.1   Summary of the role of collaborative pedagogy

While discussing the role that collaborative pedagogy plays in the education of architecture student the respondents pointed out that architects will commonly say that they work in an interdisciplinary way in practice (a point which is debatable and will be saved for other research) though few have been taught to work collaboratively. There seemed to be consensus in the need for a collaborative skill set. The respondents offered

a number of thoughts on how this might be taught and most agreed that the design studio was a good forum in which to do it a topic discussed further below.

4.3.3 The collaborative skill set

The interviews conducted for this research focused considerable discussion on the facilitation of collaborative engagement and the tools required to do so. In discussing the tools that make up the collaborative skill set the respondents noted that the single most important skill was the ability to develop and maintain a dialogue with fellow collaborators.

One respondent described it this way,

> When we get building construction students and architecture students together the first three weeks you have to talk about language.

> Collaboration is functional. Whether its research or instruction, part of that is getting over your own vocabulary and beginning to understand and have empathy for the vocabulary of the collaborator. These perceptions that students from management bring, or engineering bring, or our own architecture students bring, it has to be overcome before we can get meaningful collaboration and partnering and the joint exercise of problem solving, alternative generation and so forth. So yeah I do, but I think it's a lot harder than I think you give it credit for (Connors 2005).

Another respondent, on a similar note said,

> There's also the greater danger of them just finding having no common language. … [For example] the generalist can't even speak with the specialist anymore. I do see that going on (Peterson 2005).

A number of the respondents felt that information technology is playing a growing and significant role in maintaining the dialogue between collaborators.

> The other thing is that collaboration in terms of widening the net of expertise of people who can contribute to the education of the students.

> This is something that, with information technology, has become more feasible. So, you know, like for instance, on my experience I used to conduct these kinds of _____ design which is nothing new. Obviously, it's been done before. But I find that it is much easier to bring in expertise through video conferencing than to fly them over and go through the expense and the trouble of doing that. So collaboration, in general, I would say, you know, we need to do a better job of it. It is a better match for what they face when they get out of here if we actually change it. But I don't think we're doing it yet (Jackson 2005).

This respondent went on to discuss how technology has changed the availability of information by looking at the model of the twenty-four hour librarian and how that model might be adopted to a design services model.

> I would say, spatial technological in the sense that distance and the lack of information technology are obstacles to collaboration. So you either have a different spatial organization of departments so that you couple people from different departments that need to be adjacent to each other. Or you try to use a more kind of integrated, seamless information technology system in order to enable people to reach out to individuals.
>
> I'm thinking, for instance, in a different area in the model of these 24 - I don't know if you've heard of this - 24 hour librarians where you can always go online and find a librarian and ask a question and have it answered very quickly. There's a network of librarians who volunteer their time to be available to answer questions and do some kind of research on your behalf. I mean, it would be really fantastic if that kind of network is available to architects. You know, to have, let's say, consultants and engineers volunteering their time and somehow they get something back. Let's say there's a network of architects who, you know, offer simple design services. You know, you can give your time for a kitchen or something. I don't know. It's just I think that information technology can help in that (Jackson 2005).

Another respondent describes the use of information technology as the facilitator of a collaborative dialogue between students and faculty in different geographic locations and gives examples of how it was used in previous course offerings.

I've run a studio, virtual design studio, for three years in Hong Kong, from '96 to '99. And we partnered with various groups around the globe. And what we attempted to do in one of those studios is to kind of take advantage of the fact that we operate in different time zones, and create this kind of 24-hour design cycle, like a 24-hour global operation.

So in '97, '96 and '97 - '97 - we teamed up with EPH in Zurich and the University of Washington in Seattle, to create for a week, a 24-hour design operation. That was to bring students from very different cultures and very different backgrounds together. And we were able to do it only for a week because of the, again, all sorts of logistical obstacles that got in the way, like the different schedules of the various schools, and etc., etc.

But it was a very elucidating effort that kind of - that didn't actually highlight the technology, like the technology was simply an enabler. But kind of it opened up all sorts of interesting possibilities, I think, that future practices will get to exploit.

And I'm pleased to say that we now have these global operations in a number of architectural practices already existing, where some work gets done during daytime in location X, and then, when the sun breaks in some other place, they take on the project, and so on.

And that raises a whole set of other issues because there is this kind of aspect of social and cultural pollution in how we kind of deal with information. I call it pollution because then the things will get interpreted differently. Like what resonates in one culture may not necessarily resonate in another culture. And kind of trying to - and calculate these subtle cultural and social differences, and conduct of a kind of cross-culture or cross-time zone operation is a considerable challenge.

I did a studio with the National University of Singapore when I was in Hong Kong. And the deal was that we'd run it collaboratively. And we actually wanted to kind of delete the notion of authorship in design by having students choose somebody else's project, like, every two or three weeks. So we divided the studio program into five phases, and we said at the end of each phase you have to choose somebody else's project to work on.

And that kind of brought all sorts of interesting models to mind, that what we have instituted is a kind of evolutionary design, that only the best design ideas would survive this selection process because four or five students could go for the same project, like as they moved from phase to phase. And these are some of the ideas that we saw in the initial studios.

But then we decided by working with the Singapore, we thought that we would kind of erase these kinds of cultural differences that would exist between places and cultural misunderstandings. And Singapore having this kind of large Chinese population, and Hong Kong, again, being Chinese, we thought that we would have some kind of cultural thinking so to speak, and that they would be in tune.

And, actually, what we have discovered is there are huge cultural differences, and all sorts of misunderstandings that took place during that semester. And we reported on that studio. It has been published in Acadia. Like all of these collaborative efforts that I'm describing, you will find them in Acadia proceedings in '98 and '99 from the conferences.

So what we have discovered is that in conceptual stages, students had no trouble kind of moving fluidly, basing different ideas, appropriating somebody else's idea and then, trying to develop it further. After eight or nine weeks into the semester, like, after half of the semester had passed, they have started to glue themselves to certain ideas. And then, they actually developed strategies to circumvent the kind of system that we have set up.

So they actually wanted to work on an idea. They had a difficulty kind of detaching them self from what was theirs and then working on somebody else's idea. But that came much later in the project when a certain idea had to be developed in greater detail. But in the early stages, where the concepts are influx, again, they had no problem moving across the kind of landscape of ideas, picking what they think was the best (Jones 2005).

This use of technology applies the twenty-four hour librarian model to the design studio by creating a twenty-four hour global studio, a technique that has been adopted by a number of international design firms. This respondent used the two models (twenty-four

hour librarian and twenty-four hour office) to inform and adapt the design studio resulting in an alternative form of academic collaboration.

4.3.3.1 Summary the collaborative skill set

When considering the collaborative skill set it was found that the primary tool needed for sustained collaboration is the ability to establish and maintain an ongoing dialogue and this requires the establishment of a common language. It has also been determined that the process of establishing a common language is one that can be taught or coached in the classroom environment.

4.3.4 Implementation of collaborative methodologies

An active point of discussion during the interviews surrounded the mechanics of how you incorporate the use of collaborative techniques in the classroom and the impact of doing so. The discussions under this topic fell into one of three general categories: barriers to implementation; overcoming barriers encountered; and grading and assessment of collaborative work.

4.3.4.1 Barriers to implementation

In the course of discussing the topic of collaboration with the respondents, many pointed to the various barriers that can be encountered when trying to implement collaborative techniques into an existing curriculum. Some of the observations made during the interviews include these comments from a respondent which addresses some of the issues associated with implementing collaborative techniques.

> At the moment, there is little collaborative education actually taking place at our school and the barriers to that are numerous. There are disciplinary barriers. There are also institutional barriers. And there are logistical barriers.

In many, many disciplines, especially in professions that engage in professional training through education, the kind of - the need to transfer sort of essential knowledge of the profession sort of drives the curricular development because not everything can be taught in a limited amount of time that students spend at schools. You know, whether that's law, medicine, architecture or engineering. So anything that goes beyond the kind of immediate needs…

The most important needs of the professional education are not considered to be of say, substantial importance to the enterprise. Institutional barriers have to do with the sort of reward for the effort, if I can - if that is a term that I could use. You're work in the university, so you know that if you were to teach a class with a colleague from another department, the immediate question that you will get from the department heads will be, okay, how do we divide the credit units.

So in other words, is it going to be 50 percent committed to architecture and 50 percent attributed to whatever, either mechanical engineering and so on? So there are these kinds of institutional barriers that have to do with the funding of the various educational activities. And the universities, for their part, they're recognizing the kind of impediments to collaboration that exist within the institutions, and are actually seeking out ways to address that.

In the university where I teach, typically how that is done is that new programs get established to teach in a collaborative fashion. So we have a digital media design program that is a collaboration, between engineering, computer science - actually, computer science, and the school of communication, and the department of fine arts.

So, typically, for some kind of collaborative effort in education to take place, a new kind of set up has to be made, as was the case with the program that I've just described. The university's also trying to prod the faculty to bridge the boundaries of their disciplines because they have recognized the kind of creative potential of the cross-disciplinary collaboration.

So at our university, they have pioneered the field of bioengineering, where some of the engineers, and some of the people from the school of

>medicine, and so on, a couple of different departments, started working together and got the institutional support, which, I think, many of these collaborative efforts ultimately require. And they're, again, logistical impediments to collaboration.
>
>Even within the same institutions the scheduling of the various activities is, actually, not always in sync. So in other words, if you want to do with a joint studio, and you want to bring in say, some engineers with whom you would like to teach some subject in collaboratively, that, again, also involves certain logistical hurdles to be overcome (Jones 2005).

This respondent notes that at his institution the barriers likely to be encountered when attempting to implement a collaborative methodology in the classroom. These barriers include: disciplinary barriers, institutional barriers, and logistical barriers.

Another respondent noted the difficulty of introducing "new ideas" into an established system.

>…older faculty who have been doing things a certain way for a long time so introduce a new way for their studio to get taught that kind of forces them into that environment would be really tricky right now (Smith 2004).

This comment gets at the heart of human nature and the difficulties that many face when encountering change and points to one of the most difficult barriers to overcome. This respondent goes on point out that collaborative and interdisciplinary efforts are time consuming and require substantial effort to implement.

>…it's always at least initially more time consumptive and its more logistics more unknowns um more pitfalls and landmines so it's more work (Smith 2004).

In a similar comment another respondent says,

>Just as an observer interdisciplinary instruction is not easy. It's very, very difficult, and you have to have the patience, you have to have the time, and you have to invest in the infrastructure that requires an

interdisciplinary experience to be successful. I think design studio is an ideal role model for that, but using technology to do it (Connors 2005).

Another respondent said,

Because most schools it's very difficult to do, from not tenuring the people who are in multiple disciplines to not valuing the courses that do that. If you have an intense research institution that you're coming from or I'm But because we still do things where you have to have ownership and who did it and why did you do it, it has to be attributable to an individual (Wilson 2005).

Another area of concern that emerged during the interviews is the apparent perception that collaborative work (both interdisciplinary and intradisciplinary) can have a negative impact on the tenure process.

…there is nothing in the tenure and promotion structure that requires depth or isolation independence alone. There is a sort of common myth out there say this is the case, but this is promulgated by people that have chosen to do it that way. I happened to run against the grain my whole carrier and never had any problem; I am much more interested in someone who has bandwidth rather than narrow focus. I have collaborated on most of my work, whether it is creative work or scholarly work, edited major publications, organized conferences, all of these are collaborative adventures (Thompson 2005).

Another potential barrier exists when teaching is shared by more than one faculty member in a co-teaching arrangement as described by this respondent,

…co-teaching does it count as a full course? Is it part of the full load is only part of the course, you get into teaching or work load issues with faculty which is also a kind of can of worms (Phelps 2005).

A recurring theme in the discussion of potential barriers to implementation was accreditation and the requirements that accreditation mandate on a curriculum. One respondent noted that,

> We have to maintain our accreditation so every course has a set of criteria that has to be met, and if it doesn't fall in this category, then we can't take it on (Stevens 2005).

Another respondent had a very similar comment stating that,

> for some people the design education process is all about accreditation standards and checking the boxes and making sure that you know certain technical facts and that you have capability in exercising a decision making within a very narrow realm (Smith 2004).

The same respondent also commented on the fact that the curriculum has a limited capacity to address the many demands being put upon it.

> …because the demands on our time are so intense severe and the demands of the accreditation societies that are out there, we keep trying to pack 10 pounds into a 5 pound bag and something got to give… (Smith 2004)

The difficulty with these growing demands is that it effectively makes every program exactly the same and eliminated the richness that diversity of ideas and pedagogical approaches can bring. A position shared by this respondent,

> Are you going to put everybody in the same bag? That's what accreditation does. We look at England and UK and what ___ had done and what that does for education and it's not good. Diversity, differential points of view, differential objectives kind of goes against the grain of accreditation and licensing (Connors 2005).

This respondent points out that in his opinion accreditation and the accreditation process pose a significant barrier to the implementation of alternative approaches and curriculum. This is due to the fact that the number of credit hours required by NAAB or similar accrediting bodies often leaves little room for substitution or modification. Another barrier is the prescriptive manner in which the NAAB requirements must be addressed.

4.3.4.2   Overcoming barriers encountered

After discussing the potential barriers that might exist when implementing collaborative methods into a design curriculum the discussions moved to how these barriers might be addressed. It would stand to reason that it is much easier to implement a collaborative pedagogy, either intradisciplinary or interdisciplinary, is to do it where a track record already exists and that was found to be the case in programs that shared a common first year experience that included students from multiple disciplines. This respondent is part of a school that has such a program.

> The foundation here is kind of a space where a lot more of it [collaboration] happens and perhaps that the terrain or the turf of the first year because there is a whole other deal called beginning thresholds, foundations, whatever you want to call it tends to be a space apart or a space that can be made apart. Decoupled if you will, from the rest, the disciplinary stuff and here it happened primarily because the dean was coming from another school where it happened. The whole gambit of institutional as well disciplinary had its problems with that but it was writ from above [by the dean]. Obviously, the writ from above needed a couple of years of consensus making or the appearance of consensus making or a particular set of ideas. But it wouldn't have happened without on its own. That's what I am saying; it wouldn't have come out of the institution as a model. (Brown 2005)

This respondent notes that the inherent relationships that some disciplines have make it much easier to facilitate collaboration. For example there may be a viable relationship between sociology and architecture though not as easily facilitated as architecture and landscape architecture.

> On a multidisciplinary approach, it's a little bit easier, construction and civil engineering, mechanical engineering - those approaches are -, I have to work with the department chair from each one of those different departments, and we're trying to do some common courses.

> Okay, common courses, and we do that at the entry level, we're trying to do that at entry level because, as an example, structures in the architecture curriculum can be similar to structures in the civil engineering area, can be similar to the construction area.
>
> So it could be one common structures class of all three, so they get introduced to it to break the barrier down. We haven't been able to do that yet between other - I won't say nonrelated - between other interdisciplinary areas like the psychologists or the sociologists and all across campus.
>
> But I think that it starts from the top down, it starts from the head, it starts from the president, it starts from the dean, it starts from the department chair, trying to work together, and then the professors, and then hopefully students will be able to work together, too (Stevens 2005).

This respondent points to the use of common or core courses as an incubator for collaboration, Stevens points to the fact that this can be particularly effective in the entry level courses. By pursuing collaborative engagements early in the students college career there is less likelihood of a predisposition in favor or against the use of collaborative methods. There is also a greater likelihood of ongoing collaboration when positive collaborative experiences occur early in the students' academic career.

Another respondent addressed some of the issues pertaining to co-teaching saying,

> co-teaching does demand two things. One faculty willing to do it and of course if you talk to faculty they tell you know that co-teaching can be just as hard as teaching. Even though you might be only teaching half the courses, you were still putting in all the work of a full time class (Phelps 2005).

The structure of the university itself can play a large part in how easily collaborative efforts can be initiated. This can be an issue of politics or philosophical stance but more often is an issue of finance as noted by this respondent.

> We're lucky. This university is set up like a traditional university with a centralized monetary system and management through the provost and the vice president's office.
>
> This is one of the kinds of schools and there are many of them, where management and the financial system are decentralized to the individual units who are responsible for their own budget. So I gather my own tuition. I spend my own money. There is a whole series of complicated things where I pay taxes here and there of various types.
>
> But because of that the schools become - there's a threat in this system when schools become very much silos under themselves, protecting their income, and protecting their financial situation. We are working to soften that system right now. It's a new system here. We're working to soften that system so that it doesn't calcify into these silos. It can very quickly.
>
> The old system, the other more traditional system of centralized management, tends to erase some of that. But it also tends to cause problems for interdisciplinary activity because the university doesn't hand money out that way. It hands money out in a departmental way (Wright 2005).

Another respondent noted,

> It raises questions about how should we be teaching; how pertinent that is that we maintain these divisions within the university if they are starting to radically blur out in the field and might we be looking at some much more radical blurring within the university as well to better prepare students to operate in this new condition that there increasingly facing in the work world. So there is an example of kind of collaboration with the professions that has a kind of uh backward effect on how we teach and how we structure ourselves in adversity (Phelps 2005).

Some of the respondents found that their research and publication efforts presented ample opportunities for developing relationships for future collaboration.

> One of the interesting things is we're finding, I think if we applied to any conference in the country - nursing conferences, neonatal care

> conferences - we are the anomaly. "You're a designer? Oh, we'd love to!" They love to see our pictures, they love to - and yeah, when we say to them, "Look, as a designer we see all the issues."(Wilson 2005)

Interestingly, opportunities for collaborative research and dissemination like the type mentioned above offer opportunities for ongoing collaboration in the classroom.

4.3.4.3   Grading and assessment of collaborative work

Another point for concern when considering the use of collaborative techniques in design education is that of grading and assessment. Already a point of much consternation (Anthony 1991; Boyer and Mitgang 1996; Dutton 1991; Nicol and Pilling 2000) grading and assessment of collaborative project can be particularly challenging in terms of grading "fairness".

One of the respondents offered these comments on grading of group projects,

> …what I have done in some of those cases is involve all the students in grading each other as well as grading all in an open manner. In other words, the idea that grades come, let's say at the end, and they are anointed by a divine perspective is part of the problem. One of the things that is more important than the grade I think ultimately is the feedback and if you cultivate feedback not as something only you award but something that exists among peers. Then collaboration is a lot more present because the correspondence between individuals to both generate, achieve and review, debate, regenerate… achieve and review, debate, regenerate… and that's process of cycling where the review is something that the critic, his agent, is contributing too. As well as contributing to idea generation you can role model, deep collaboration and understand that it's a phenomenon that is not simply a construction that puts people in the challenge of working together towards a common end. …I think you can still evaluate individuals' efforts on that and I quite frankly, I find students are harder on each other than any faculty member is on them. When they have to be accountable for those evaluations, in other words, its public, also some really important things happen. Important conversations take place. You can't be a wildcard in that. You

learn another way, another measure of collaboration. You also can't be a weakling because you get run over (Thompson 2005).

Thompson notes the increased level importance that feedback plays in the context of a course based on the use of collaborative techniques since it has the ability to highten the level of collaboration between the student collaborators. He also points out that the students should be an active part of the assessment process by peer grading their classmates and group members.

Based on similar thinking, another respondent noted the approach used by this individual in group based design studios.

> I keep close track of who's doing what. I employ intelligence gathering techniques… I would actually interview - informally interview students asking them who's doing what. Asking them if they have complaints about the group; Pointing out to students that are not doing work that they should do work and contribute. Kind of like pointing them out so they can defend themselves. The reason I do it, not to kind of embarrass the student but basically to allow him or her to kind of tell me their side of the story whether - what they have done and they usually they do. And, again, I kind of pit them against the other students and say, "Okay so, you know, this person says that they did this and this and is that true," and kind of - at the end it comes out. It's not a very pleasant process. I mean, I must say. But I find it necessary to find out exactly who's doing what. But, however, at the end I usually give the group one grade not different grades.

> However, I always follow group work with individual work. And even though I do not announce it to students formally, my grading has been always influenced by their individual contribution to group work to the first phase of the project which is usually group work. It's centered - my - and that centers into a portion of their grade that is kind of my impression of their work ethic and their contribution to the studio. Their overall contribution to the studio which is usually a small percentage of the grade, let's say five-tenths percent of the grade. And that kind of impression that I form of the students - I mean, its subjective grading obviously, is based on my perception of what they did during group work. So even

> though they got one grade for the whole group, I have already formed individual evaluations of them and of their work method and work ethic. And that centers at the end of the semester. That finds its way into the final grade (Jackson 2005).

Jackson points to the importance of closely monitoring the collaborative process by routinely discussing the process (informally) with the student collaborators allowing the faculty member the opportunity to intercede in the event of potential difficulties with the group dynamic.

Another respondent supported the previous comments by saying,

> We are always struggling with the in demand of the university that we give individual grades to individual students. And so you have to kind of balance this exposure to team work and working together with still the need to have something from everybody so that you can give a grade… (Phelps 2005).

Yet another replied by saying,

> I think you can still evaluate individuals' efforts on that and I quite frankly, I find students are harder on each other than any faculty member is on them. When they have to be accountable for those evaluations, in other words, its public, also some really important things happen. Important conversations take place. You can't be a wildcard in that. You learn another way, another measure of collaboration. You also can't be a weakling because you get run over.
>
> I… well again, what I have done in some of those cases is involve all the students in grading each other as well as grading all in an open manner. In other words, the idea that grades come, let's say at the end, and they are anointed by a divine perspective is part of the problem. One of the things that is more important than the grade I think ultimately is the feedback and if you cultivate feedback not as something only you award but something that exists among peers (Thompson 2005).

The respondents were also asked how they deal with a situation where group members are carrying a "freeloader". This respondent replied by saying,

> So I don't only blame the student who is not doing any work for not doing the work. There is some - maybe perhaps much less blame but there is some blame that goes to the two students who could not find an effective way to make that person work.   It's - I mean, you need to have that skill. You need to be able to convince people to - you assign them a task and you, you know, you make sure that they do it or you, you know, you find a way to do it or you find them a different task.   And perhaps they have to find their own task for that person more than that person can do. Leadership.   I mean, it's also an issue of leadership and you're looking for that in students.   But in terms of grading, as I said, yes there is always - it's always implicit. It's always subjective but it filters in the next phase when they're doing individual work where my impression of them as a student and what they have done in the previous project - the previous collaborative project - affects my view of them and my grade of them. But I can't really quantify it that much. I mean, as I said, in my mind it's about 5 or 10% but I've never used a calculator to do it (Jackson 2005).

This respondent really identifies an important issue by addressing the topic of leadership. This is perhaps one of the most fundamental skills of an architect and the use of collaborative techniques allows the students to learn to be leaders through application. The interpersonal dynamics of a collaborative engagement in the classroom offers the students a chance to develop this critical skill set. Another respondent notes that,

> collaboration also creates certain kinds of tensions because it seems invariably in every team there some students who work more than others you know and so you just have to make sure you not penalizing the hard workers by kind of giving shelter to ones that aren't working as hard (Phelps 2005).

This respondent addresses this issue of interpersonal dynamics and the value that can come out of controlled tension in the design studio but notes that this can be a factor in grading and assesment.

4.3.4.4   Summary of grading and assessment of collaborative work

As discussed, there are a number of potential barriers that could be faced when trying to implement collaborative methodologies in the classroom. These barriers could be structural, political or social and may be a combination of the three. Collaboration can be difficult and often requires more work than a similar exercise done in a non-collaborative manner. Much of the difficulties that surround collaboration are related to grading and assessment. Parallel, redundant and triangulated grading systems are often necessary to insure an accurate overall picture when assessing classroom performance.

4.3.5   Collaboration in the design studio

The final portion of this section focuses on the design studio and issues that relate to the inclusion of collaborative methods into this setting. The scope of discussion with the interview respondents on this topic can be categorized into three principal areas: the role design studio holds for the collaborative education; the appropriateness of design studio for the implementation of collaborative techniques; and the perceive impact of collaborative techniques on creativity of studio respondents.

In an attempt to understand the perceived impact of the use of collaborative techniques in the education of architectural design students the interviews focused considerable time on the design studio itself. The design studio commands a majority of the classroom time of an architecture student and has an apparent curricular flexibility not found in lecture based courses. The respondents were asked to consider what role the design studio holds for the collaborative education of architecture students? In responding to this question one respondent noted that,

> I think design education could do that. I'm not sure it fully does that, but I think it's the best model out there so far. So the question is how can we make it richer, and who else should we be partnering with? Should we be partnering with entrepreneurship?   Should we be partnering with

leadership? Should we be partnering with political and policy makers so that there's a much richer way of looking at something (Wilson 2005)?

Another noted that,

> I think properly considered the studio is that ideal paradigm. However, the studio is still outcome based; it is still physical outcome based and so, until we expand the definition and the role of studio to be… It is just as valid for example to pursue a set of questions and to expand those questions to a greater number of questions that have yet to be addressed, that that's also a legitimate studio. Until we can actually treat studio as research where we really do bear down into, cut deep into some set of topics, and you may not work synthetically to put it back together, that you have contributed something by group effort and exposed, or cut into some… (Thompson 2005)

The respondents were then asked if they were aware of any examples outside their own university that were very collaborative in the approach that they take to education.

> The University of Oregon, there's a lot of collaborative work. They built it into their culture in every course, so it's not just collaborate, "Oh, we'll do a little bit of collaboration here," like the way we're doing a little bit of sustainability. It's pervasive. It's a given (Wilson 2005).

Another example offered,

> The University of Illinois Urbana-Champagne, family resiliency is a program. It's a cross-disciplinary program that goes everywhere from health, education, housing, etc. Really robust, and there's tons of research seams in there. We could be bringing that to the table. What designs would allow for particular kinds of resiliency, and what designs don't? What is a housing design that allows for transformative communities for variable commitment of people living together? Those are research projects. So I think there's a lot of stuff out there. But we at universities don't understand what that is as research, so somebody or a consortia of people at various institutions would have to put a document together where they could see service as research (Wilson 2005).

This respondent was then asked to describe what they thought made the problem solving environment of the design studio a good environment for the use of collaborative techniques both disciplinary and interdisciplinary?

> I think what we do very well is we know how to set questions and know how to ask the right questions, and I think that's very valuable. And that's what this kind of education can do; if that is the only thing that we bring to the table for every other discipline that would be good enough… (Wilson 2005)

In a follow-up the respondent was asked to describe any difficulties that they noticed in the way that studios are currently taught and how they might need to be adjusted to better facilitate a collaborative pedagogy?

> We don't see them systematically. We're always starting anew. We don't do assessment. In architectural education there are 10 studios; 9 are probably almost the same methods of learning and procedures, and they're all maverick. Every teacher starts with their own kind of agenda, but they are often one-off and they don't necessarily build in a collaborative manner (Wilson 2005).

The respondents were then asked to consider whether the design studio is a forum appropriately suited for the implementation of collaborative techniques? One of the respondents responded saying,

> This is the moment that we interject the current model of education and that individualized approach to learning and we have to push the question and that got to be interjected into your collaborative model is the ability to address that issue and individualize learning approach because it will be different for each individual. An instructional environment that is linear in one way shoots in the middle or shoots at either extreme is not creating a learning environment, if that's the current definition of successful learning. So, I think you have got to incorporate that issue into that, and there is where your technology issues come walking in and the ability to address that, how much craft, how much intellectual curiosity to explore and those issues. And I don't know if there is a static answer to that. Now

> my personal opinion is no. It just depends. It's a studio environment do you teach every student the same way? No, some you ride harder than hell, you use them and try to get them motivated, because you have faith in them and some you're soft with because you know that there is ……. Some you send this way to learn and some you send that way to learn. So that's… (Smith 2004)

Smith notes that it is particularly important to continue to fine tune the instruction on an individual student by student basis. This can easily be done to compliment the collaborative exercises being conducted in the classroom.

Another respondent addressed how they have used these techniques in their studio teaching.

> You want to make sure, again, here's another great opportunity to have another mode of learning, which is collaborative. And even what we're doing in our studio is we spend part of the studio as individuals, and then we bring them together. And I've built studios that have always been collaborative that start in teams of two, then move to teams of four, then move to teams of eight. And so we don't have to do Myers-Briggs testing, because we actually can do it by a visceral sense of "Is this going to be a good partner for me?" And there's many tests we could continue to do, but you have to be whatever. I guess you have to be a Jungian to believe in Myers-Briggs anyway, so you already have to be something… (Wilson 2005).

This same respondent continued by theorizing how these techniques might be applied to other studios.

> I think there were some incredible openings, and we were able to do some great projects. We're doing a project now which I have to say is led by us on rethinking neonatal intensive care, and it's both environmental/product/social system, so we have biomedical engineers, we have a neonatologist, we have a pediatric neurologist, we have a medical anthropologist, two architects, and a group of PhD students, or Masters students who are developing this project. Which could become anything, like low-hanging fruits and working with Mattel and coming up

with toys for the neonatal unit, which don't exist, which is unbelievable to imagine they don't exist (Wilson 2005).

One respondent indicated that they felt that there needed to be a change in the way our discipline views the role of design and this should be considered when looking at the design studio.

I think there has to be also a kind of cultural change within the profession, within the discipline, that kind of recognizes the obsolescence of this model of a single creative mind, being able to, again, creatively operate in, again, a contemporary economic and social environment. You know some of the challenges, again, are cultural. And speaking about the culture of the profession, like the things that we cherish and that we celebrate as, again, successful models in what we do (Jones 2005).

Yet another pointed to the new dynamic created through the use of increased collaboration in the design studio.

…the correspondence between individuals to both generate, achieve and review, debate, regenerate… achieve and review, debate, regenerate… and that's process of cycling where the review is something that the critic, his agent, is contributing too. As well as contributing to idea generation you can role model, deep collaboration and understand that it's a phenomenon that is not simply a construction that puts people in the challenge of working together towards a common end. That true, but it's not enough, it seems to me that the feedback the cycling. I have also done some things where tradeoffs, where one group of students will take the developmental phase to a certain point and then I'll recontour and other students will take other analytical phases and you recontour so you get representation from different research teams now collaborating on a synthetic phase of the process. And they become ambassadors of the work that they shared in the context of a new sharing of the work they're generating and that helps break down the sense that it is a heroic trajectory, something linear (Thompson 2005).

This dialogue that is created between the students is the foundation of collaborative inquiry and a critical component in the preparation to enter professional practice. The ability to initiate and sustain a working dialogue is a critical tool in the architects palette of skills.

In a more cautionary position, one of the respondents noted concern over impact of trying to add too many objectives to the design studio sequence.

> They're doing very formal explorations, partly because the learning process of being very rigorous but also being creative really does take a lot of time anyhow just to do that. And if you put too many criteria in just the whole thing gets watered down… I think the dilemma is it does take a long time to really learn how to do a good design process. And that that's valuable in its own as a pedagogical imperative (Wilson 2005).

The respondents were also asked about using the studio as a point of interaction between the other classes that the students were required to take and more specifically the interaction between support courses such as building systems, structures, and building technology and the design studios and if they had experience in doing this.

> Yes, in fact we do that here. We have a semester where building systems structure and design are in lockstep they are taught together, it a kind of expanded studio and furthermore it's taught in such a way that experts are brought in, the way consultants are brought in on a team. In fact we use outside structural engineers, we use outside experts in mechanical electrical, systems engineers, etc. We work here with the engineering school to do this, but students study building systems as part of their design project; you can see those models out there. They build large-scale models here where they see how buildings are put together. We are not unique, but we were the first to do this. Then as they move from an understanding of some precedent that their group has been assigned to, to construct and understand, they put together this pool of precedents that a whole studio looks at so they learn from each other and then they turn and work on a design process. This is head to tail linear from one faculty to another… (Thompson 2005)

The respondents were also asked if they felt that the use of collaborative techniques was becoming more pervasive in their own institutions.

> Many of us don't; we work in "let's get the team together, let's hear what everybody's doing, and let's share this information." There's other times where you could be at your desk alone, but when I'm in the room let's be sharing everything that's happened to date. Let's use the homework as a vehicle for discussion, not just me and you working together. But we still do privilege, we privilege the solo. I mean, we've had team thesis projects. They're rare; in general they're better students who are willing to take that risk. They're not the weak students who do that. We've had middling students and great students do it. But there would have to be a very different shift in who you hire (Wilson 2005).

The respondents were then asked to give their perceptions of whether or not collaboration can be a creative enterprise and does collaborative engagement diminish creativity in the context of the design studio?

> Well, I don't see them as oppositional, I think they at dialectical, there different. But, they are not oppositional; one doesn't need to choose between those two ways of being and ways of conducting oneself. Because I do believe there is a tremendous value, an understanding as an individual that your own projections and your own synaptic energy that comes from your own intellect and talent has value. That value is an independent value that is the value of contribution. The question really for me is confusing that value with the questions of control and the creative work that's achieved when respondents or collaborators realize that not only do you contribute, but you trigger others to think even more dynamically about their own thoughts and their own contributions manifoldly rises almost like a sort of synergy together, if it can be healthy, trusting, open. So, it's not, I don't like, they are different, but I don't like to think of them as oppositional (Thompson 2005).

This point that Thompson raises is an important one and one that is often overlooked by the design studio traditionalists. The ability for students to extended their creative

potential based on the stimulus of their fellow collaborators is an important concept that merits additional inquiry.

Another respondent took an even more forceful position stating,

> I would argue completely against that. I would say that collaboration will enhance creativity not hinder it if it is done correctly… I think, if used correctly, it will actually push them more to be more creative… We're not talking about - we need to be careful that we're not talking about design by committee (Jackson 2005).

This same respondent went on to say that

> We're really talking about sort of - how can I say this - allowing the students - giving them experience in how to work with others and how to kind of creatively seek solutions in a collaborative manner so that they challenge each other and they push each other to actually come up with creative solutions. It is not only an issue of compromise. So it's not an issue of _____ engineering the creativity out of the proposal or the, you know, sort of like extracting it or simplifying it so that it works and it's acceptable to the least common denominator. We're not talking about that.

> I'm looking mainly at, for instance, the fact that schools of architecture never allow collaboration - meaningful collaboration between our special students, let's say, and engineering students or engineering faculty. So there is never that - there are a lot of missed opportunities. We kind of - when we do design, we kind of only start out only in the studio and only the professor sees the project. It's kind of like - almost like a secretive project. And only when one has advanced certain levels do we allow, you know, other faculty to come in. Maybe one person or two people and the, at the end of the semester when ____ a little but we open it up a little bit more (Jackson 2005).

4.3.5.1 *Summary of collaboration in the design studio*

When considering the design studio the respondents discussed a number of issues. One of considerable focus was the appropriateness of the design studio as a forum for

collaborative engagement that went beyond the historical function of a design studio. Many of the respondents pointed to the fact that the social nature of the design studio offers students the ability to develop, practice and refine the dialoging skill required for sustained collaboration a point supported in general terms by Lave (1991). There was debate on how this might be achieved and the implications that it might have on the curricular requirements mandated by accrediting bodies such as NAAB. There were a number of examples provided where collaborative techniques were utilized in the design studio. Many of these included community based efforts and several respondents pointed to the roll that technology can, does and will play for collaboration in the design studio.

5   SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1   Introduction

The purpose of this study was to document and describe the use of collaborative methodologies used in the education of architecture students in select US schools of architecture; to investigate respondents' perceptions of the role of collaborative methods in design education; to identify factors that inhibit and facilitate the incorporation of collaborative methods in the institutionalization of a collaborative design studio.

Data was collected through the review of literature and semi-structured interviews with fourteen academics of varied rank and geographic local. Data analysis for this naturalistic inquiry was completed in conjunction with the methods outlined Lincoln and Guba (1985), Erlandson (1993) and Lewins (2007). This process included the uses data analysis software (AtlasTi) to reduce the data into units of meaning and subsequent categorization through aggregation.

5.2   Summary of Findings

The findings for this research can be categorized into five general themes: Levels of Collaboration, The Role of Collaborative Pedagogy, The Collaborative Skill Set, Implementation of Collaborative Methodologies and Collaboration in the Design Studio. Collectively, these themes begin to paint a holistic picture of the collaborative design pedagogy and its use in architectural education.

5.2.1   Levels of collaboration

Through the course of the interviews the respondents revealed their experiences and perceptions of collaboration at the levels of community, institution, faculty member, and student. At the level of community the respondents spoke of interaction between their respective academic units (University, College, School and Department) and the community that they served. There were a variety of examples given of collaboration at the level of community. These included building projects that sought to provide architectural solutions for members of the community that might not otherwise have access to such resources. These included building projects in Native American communities, Habitat for Humanity based projects, and other community service building projects. Other community based programs came in the form of community outreach efforts to disadvantaged youth that would be statistically unlikely to pursue a college education. These programs brought disadvantaged youth on to campus to engage in design exercise that challenged their creativity and intellect while sowing the seeds of desire for pursuing a higher education.

At the level of institution, the respondents shared experiences associated with collaboration between units on a campus. These experiences highlighted the role that institutional structure places in facilitating collaborative engagement between units on the campus and how that role can differ when financial resources are distributed from a central point on campus as opposed to the structure where financial resources (tuition dollars) are controlled at the level of the college in a university structure. Other revelations exposed that it can be much easier to facilitate collaboration between units in the same college than between units of different colleges.

While considering the role of collaboration at the level of faculty member the respondents pointed to another of issues including loading, impact on tenure process,

co-teaching and the role that the faculty member plays in sustained collaborative engagement. When examining the potential barriers faced by faculty members considering the use of collaborative methods in the classroom a central concern on the part of faculty and administrators is loading. Where this becomes a central area of concern is in the context of a shared teaching load as found when co-teaching. When there are shared teaching responsibilities how do you establish faculty loading relative to faculty member that does not have shared teaching responsibilities? This loading dilemma also has a perceived bearing on the process of tenure and promotion. Some of the respondents felt that this was simply a convenient excuse for not doing collaborative work that is readily accepted by many. Most of the respondents agreed that collaborative work is difficult and requires more work on the part of all parties involved. As the instigator of collaboration the faculty member is charged with creating an environment conducive for collaborative work, fostering collaborative relationships between the students and assessing the collaborative work produced by the students. Part of the difficulty for architectural faculty is doing this without interfering with the curricular requirements of a professional curriculum.

The final level of consideration in this study was at the level of the student. The respondent noted that one of the difficulties that must be understood in pursuing collaborative coursework is the maverick nature of the students (and faculty) that are attracted to the architectural profession. By definition collaboration is not usually associated with the maverick spirit and often requires orientation and practice to develop this skill set.

5.2.2 The role of collaborative pedagogy

The respondents noted that collaborative skills are a fundamental requirement amongst architectural practitioners and a skill that should be learned in the classroom. Several

respondents noted that the ability to work well with others and lead teams in professional practice were amongst some of the most important skills that the architect has in professional practice and the earlier they can be developed the better. This skill needs to be taught as well observed. Students need to see how collaboration works and this is first achieved through the process of others engaged in a collaborative process. Examples of observable collaboration include co-teaching where students see instructors working together in a collaborative manner; community based collaboration where students observe organizations such as Habitat for Humanity working in their community; and student based collaboration within the classrooms. Observation is followed by emulation where the students mimic the behaviors previously observed followed by increasingly complex collaborations.

5.2.3 The collaborative skill set

It is important to note that collaborative engagement often doesn't come naturally or easily and typically starts with establishing a common language that permits the dialogue between collaborators. The students need to be taught how to communicate with one another; thereby giving them the primary tool to facilitate sustained collaboration. As obvious as this may seem, basic interpersonal skills have not been a major component in architectural education, unlike other majors such as business. The longstanding maverick (or hero architect) model that is so popular within architectural education needs to be cast aside in favor of a teamwork approach that more accurately represents the way architects actually work. There are a number of ways that this can be done but one area of particular focus, was the use of peer critique and assessment which allows students become more actively engaged in the process of their own education as well as that of their peers.

Many of the respondents spoke of the dramatic role that information technology has played on the fostering and facilitating collaboration at all levels across the campus and especially between campuses and outside resources and institutions. Several considered technology to be a fundamental component to successful collaboration. Several of the respondents gave examples of global studios that they (or their colleagues) had organized in the past. In these scenarios the students were exposed to a global perspective on the projects that they were doing. Often these studios linked students with clients, experts, and other students in multiple locations many thousands of miles apart from one another. There is a cost savings aspect associated with this too since all of the interaction is done without cost via high-speed internet connections alleviating communication and travel costs that would otherwise be incurred.

5.2.4   *Implementation of collaborative methodologies*

While discussing issues concerning the implementation of collaborative methods with the various respondents a number of issues were brought forth. An active point of discussion during the interviews surrounded the mechanics of how you incorporate the use of collaborative techniques in the classroom and the impact of doing so. The discussions under this topic fell into one of three general categories: barriers to implementation; overcoming barriers encountered; and grading and assessment of collaborative work.

There were a number of potential barriers brought forth including institutional barriers, disciplinary barriers and logistical barriers. At the institutional level these barriers included monetary matters, accreditation issues, and potential difficulties with tenure and promotion. Disciplinary issues often related to people not wanting to deviate from "the way it has always been done" and demonstrated that change was often more difficult for more senior members of the faculty. The logistical barriers were often the most difficult to navigate. There are often cases of two faculty members that would like to conduct

collaborative classes and it simply not possible due to the inability to synchronize time and/or day of class meetings.

The respondents noted that overcoming barriers to collaborative engagement was considerably easier in institutions where successful examples already existed. This often mitigated much of the perceived risk associated with implementing collaborative techniques. With increasing budgetary constraints many units are reluctant to pursue seemingly new approaches to doing things without some previous track record of success.

The respondents also identified ways that other barriers can be overcome such as the shared relationships that some disciplines share, such as that between architecture and landscape architecture. The dependency that the two often have upon one another makes it much easier to form a collaborative relationship in the academic arena, this should not be considered a universal truth as the respondents note when pointing to engineering and architecture. Despite great interdependence in professional practice this tends to not translate as well into the design studio. Due in large part to the fact that the two disciplines have a radically different view of what design is. This is an example of where a common language is critical. Despite both being problem solvers the methodologies employed in design are often too different to facilitate productive collaboration.

The final issue addressed in this section is focused on grading and assessment. Put quite simply, collaborative techniques require a different approach to grading and assessment. Assessment of collaborative work is at a minimum more complicated, due in large part to the issue of freeloaders. The issue of students not wanting to carry their share of the responsibility on a collaborative project is one that needs to identified and mitigated as quickly as possible. The respondents mention a variety of techniques useful in managing

this potential problem including peer evaluation, journaling and the mixing of individual projects with group projects.

5.2.5   Collaboration in the design studio

Most of the respondents in this study felt the design studio was a forum well suited for the teaching collaborative techniques, though several were concerned about the already heavy curricular requirements put on the design studios by the accrediting bodies. Many felt that greater interaction between the design studio and support courses such as structures and building systems were another way to foster greater collaboration within the college or unit and really necessary to help build a "spirit of collaboration". In cases where support courses were taught in an outside unit such as an engineering department the possibility for interdisciplinary collaboration is further amplified but as previously mentioned that too comes with inherent difficulties. Nearly all of the respondents felt that greater collaboration between the academy and the community was an important consideration offering the benefit of teaching collaborative skills and instilling the importance of civic stewardship through community service.

5.3   Conclusions and Implications

1. The respondents revealed four levels of collaboration that exist at the college or university, including the community, the college or school, the faculty and the student. Conducting collaborative exercises in the classroom requires two or more of these levels of collaboration working in concert to achieve a positive outcome and can occur in nearly any combination. However the most common are student/faculty or student/student. In community based design studios, a third variant of student/faculty/community is common. It is absolutely clear that the profession will benefit from the ability of practitioners to better collaborate across intradisciplinary and interdisciplinary boundaries.

2. There seemed to be consensus in the need for a collaborative skill set among architecture students and the respondents offered a number of thoughts on how this might be taught. The primary tool needed for sustained collaboration is the ability to establish and maintain an ongoing dialogue and this requires the establishment of a common language. It has also been determined that the process of establishing a common language is one that can be taught or coached in the classroom environment. This skill set positions the architect to be the central choreographer of a collaborative professional environment.

3. There are a number of potential barriers that must be overcome when trying to implement collaborative methodologies in the classroom. These barriers are structural, political and social and may appear as a combination of the three. Collaboration is difficult and often requires more work than a similar exercise done in a non-collaborative manner. The difficulty is engaging students and faculty in collaborative teaching and learning environments and this must be overcome if the discipline of architecture is to reach and maintain centrality in guiding the development of the built environment.

4. Much of the difficulty that surrounds collaboration is related to grading and assessment. Assessment of work produced in the design studio is always complex requiring the assessment of material that can be highly subjective. When the work is produced through a collaborative process additional techniques are often required. Parallel, redundant and triangulated grading systems are necessary to insure an accurate overall picture when assessing classroom performance.

5. Debate surrounded the appropriateness of the design studio as a forum for collaborative engagement. The social nature of the design studio offers students the ability to develop, practice and refine the communication skills required for

sustained collaboration. The ongoing concern about how teamwork might be achieved and the implications for curricular requirements mandated by accrediting bodies such as NAAB is essential if this profession is to excel in addressing the increasingly complex demands of a 21st century practice.

6. Information technologies can, do and will continue to play a significant role for collaboration of all types including in the design studio. Further development in this area will be increasingly important.

5.4   Recommendations for Further Research

1. Evidence show that the there is an ongoing interplay between the four levels of collaboration. Further research is needed to understand the implications that each has upon the other and the implications of that this interplay has on a collaborative pedagogy.

2. It has been established that the most critical tool in the collaborative skill set is a common language that permits an ongoing dialogue between collaborators. Continued research is need on how this common language is established between potential collaborators providing a better understanding of the means and methods employed and an understanding of the curricular impact that these techniques will have.

3. This research details three forms of barriers that can be encountered when introducing collaborative methods into a curriculum. Each of the barriers types (structural, political & social) pose their own challenges and require their own solution. Further research is need on what these challenges are and how they are overcome.

4. There is very little literature on the use of collaborative techniques in the design studio. Further work is required detailing case studies of collaborative design studios. These case studies need to document the methods used and the outcomes achieved; with a particular emphasis on the assessment tools and techniques used in evaluating the student collaborators.

5. The use of information technology has dramatically increased the ability of educators to access resources once unavailable in the classroom. Whether connecting students across the room, across the country or across the globe is easily achieved through the use of technology currently possessed by most design students. Although the literature on this subject is extensive for other disciplines it still remains underdeveloped for the discipline of architecture and specifically as a facilitator of collaboration in the design studio. Additional research is need in this area since this is like to become the dominant method of collaboration in the studio environment.

5.5   Summary

The literature on collaborative education is focused primarily in the area of teacher education (MacGregor 1990; Bruffee 1999; Anderson, Simon and Reder 1996; Lave and Wenger 1991; Barkley, Cross and Howell-Major 2004; Bosworth 1994; Matthews 1993; MacDonald 1996) with much less available related to professional education such as legal, medical and engineering (Bennis and Biederman 1997; Alpay and Littleton 2001; Beloff and Korper 1972; Fromm 2003; Muller-Peterson 2001; Reilly 2000). There is significantly less literature on the topic of design studio education (Piotrowski and Robinson 2000; Anthony 1991; Nicol and Pilling 2000; Dutton 1991) with a large amount of that work coming from two sources, Francis Bronet (2000; 2003; 1999; 1999) and Sarah Dinham

(1987, 1987, 1988, 1989, 1989, 1990) and of those two only Bronet has written extensively on the use of collaborative methods.

A major contribution of this research is a better understanding of the perceived need and current application of collaborative methodologies in the education of an architect. The respondents in this study provided candid insight as to the role that collaborative methodologies must play in the education of future architects and recounted experiences in using collaborative techniques in the design studio. This research allows the reader the opportunity to better understand the underlying motivations for using collaborative methodologies in design education and gives a broad view of the levels of collaboration in the university structure.

Finally, a major aspect of this study identifies factors that inhibit and facilitate the utilization of collaborative methods in the design studio. Highlighting the types of barriers that may be encountered (structural, political and social) when trying to implement new collaborative initiatives. Facilitators were also addressed by looking at the elements need to sustain ongoing collaboration.

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APPENDIX A

LETTER OF INTRODUCTION

The following letter will be used as a means of introduction and to gain access for individual interviews conducted during this study.

Dean *(insert name here)*,

My name is Tom McPeek. I am an assistant professor at the Southern Illinois University and working on my Ph.D. in architecture at Texas A & M University. The focus of my dissertation research is collaborative education in architecture. As part of this study, I am interviewing key persons related to architectural education and I wanted to see if you would be willing to participate? The process would take approximately an hour and I would come to a location of your choosing for the interview.

Thanks for your time and consideration.

Tom McPeek

K. Thomas McPeek, Assistant Professor
School of Architecture
Southern Illinois University Carbondale
131E Quigley Hall, MC-4337
875 South Normal
Carbondale, IL 62901
Office: 618-453-1241

APPENDIX B

INFORMED CONSENT FORM

Collaborative Pedagogy in the Building Arts

You have been asked to participate in a research study that seeks to better understand collaborative education models in architectural education. You were selected to be a possible participant because of data derived from an initial survey of all architecture professors in the United States. The total number of individuals asked to participate in this the secondary phase of this study (individual interviews) is less than fifty (50). The purpose of this research will be to better understand collaborative education models in architectural education, the underlying motivations, and methods of implementation being pursued. The data obtained and its subsequent analysis and report will be used to partially fulfill the requirements of a Ph.D. in architecture.

If you agree to be in this study, you will be asked to participate in an individual interview session where you will be asked a series of questions pertaining to collaborative education. You understand that interview sessions will be taped using a digital audio recorder and that you have the option of not having the session recorded. You also understand that choosing not to have the session recorded will not negate your participation in the study. The interview sessions for this interview will be limited to no more than ninety (90) minutes in duration. Participation will typically be limited to a single interview session, though some participants may be asked to participate in additional sessions. In such cases, the additional interview sessions will not exceed three (3) sessions.

You understand that the risks associated with this study are minimal the most likely form of risk would be the possibility for personal discomfort associated with answering interview questions. In the event that you experience such discomfort, you will inform the interviewer. You further understand that you have the right to discontinue the interview at any point in time. You understand that there are no benefits (direct or indirect) associated with participation in this study.
You understand that you will receive no compensation for participation in this study.

This study will be confidential; the identity of all participants coded and the key to decipher the coding will be secured in a locked file cabinet. The records of this study will be kept private. No identifiers linking you to the study will be included in any sort of report that might be published. Research records will be stored securely and only K. Thomas McPeek and his committee chair Robert Johnson will have access to the records.

All interviews will be recorded in a digital format and stored on a secure computer. The interview files will not be destroyed and will be retained for future research. Your decision of whether or not to participate will not affect your current or future relations with Texas A&M University. If you decide to participate, you are free to refuse to answer any of the questions that may make you uncomfortable. You can withdraw at any time without your relations with the university, job, benefits, etc., being affected. You can contact K. Thomas McPeek or Robert Johnson with any questions about this study.

K. Thomas McPeek   Robert Johnson, AIA, Arch.D.
Department of Architecture   Department of Architecture
Southern Illinois University   Texas A&M University
618-453-1241   979-847-9357
ktmcpeek@siu.edu   rejohnson@tamu.edu

This research study has been reviewed by the Institutional Review Board- Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the institutional Review Board through Ms. Melissa McIlhaney, IRB Program Coordinator, Office of Research Compliance, (979)458-4067, mcilhaney@tamu.edu.

You have read the above information. You have asked questions and have received answers to your satisfaction. You have been given a copy of this consent document for your records. By signing this document, you consent to participate in the study.

Signature:_____Date:_____

Signature of
Investigator:_____Date:_____

APPENDIX C

INTERVIEW GUIDE

1. Dating back to *Scholarship Reconsidered,* Dr. Ernest Boyer made a case for academic collaboration at several levels (administrator, professor, student, practice, community), a theme revisited in *Building Communities.* In your opinion, what role does collaboration play in architectural education and its reform?

2. Historically the education of the architect has been very singular in its approach, focusing on the individual, with little or no emphasis on collaboration, disciplinary, interdisciplinary or otherwise. Juxtapose this against the realities of the profession that these students will enter, a profession that is highly dependent on the ability to work well with, as well as lead, others across a spectrum of disciplines. How do we reconcile this apparent gap without putting at risk the many strengths of the traditional, often highly individualized, architectural education?

3. In *The New Scholarship Requires a New Epistemology,* the late Donald Schön makes the point that the very structure of academia and the push for disciplinary independent research, precludes the possibility for any substantive advancements in interdisciplinary education, a theme echoed by, Leslie Kanes Weisman, David Shaffer and Peter Beck, to name a few. How might this be overcome in educating architects to be multidisciplinary collaborators? How can the current educative framework be modified, or possibly further adapted, to meet the needs of the greater context without losing the rich underlying format that lead to its creation as a profession?

4. In a presentation to the Western region of NCARB, Cecil Steward stated the following: "I believe all five existing collateral organizations must contribute to future change, but NCARB holds the key to new thinking and collaborative engagement. Definitive structural change will not occur without state regulatory bodies taking a lead role." What is your view of the position taken by Dean Steward and the key role that NCARB would have to play? Why?

5. The June 2004 issue of *Design Intelligence* discusses the recent move to place highly successful practitioners into command positions in the academy. Citing the examples of Garth Rockcastle (Meyer Scherer Rockcastle Architects) as Dean at University of Maryland, Reed Kroloff as Dean at Tulane, and Mark Robbins as the Dean at Syracuse. Is this a step in the right direction?

6. In a recent address, Thomas Fisher, Dean of the College of Architecture and Landscape Architecture at University of Minneapolis made a strong case for reconsidering the role of design studio education in a contemporary society. He suggested looking to the design studio as the natural bridge between the three missions of most universities: teaching, research, and service; by stating "Usually discreet activities in most departments, these three missions can come together in studios in which students and faculty pursue learning, conduct research, and engage in the community all at the same time". Where do you stand on this position? Can you give some examples of how this might be achieved? What might be the facilitators and/or barriers to implementation?

7. (How)Can collaborative learning lead to a more critically developed individual in society (re: Dewey), one more in tune with greater issues and/or an increased

accountability within a democratic social fabric and one's place in contributing to the greater domain.

8. Does this collaborative learning include as a resource the community at large? What are its limits? Who or what ideals are considered vital or critical to the issues at hand?

9. What strategies do you utilize in the grading of group based projects?

10. Would you describe some of your experiences with group exercises in the classroom?

11. In what ways have these experiences been interdisciplinary in nature?

12. In what ways do you feel collaborative and/or interdisciplinary group projects affect traditional design education? In what ways does it enhance or detract from the overall experience?

13. What techniques do you utilize in the studio or classroom to enhance the probability of success in group exercises?

14. Can you refer me to others that you think I should speak with in the course of this study?

APPENDIX D

NAAB STUDENT PERFORMANCE CRITERIA

National Architecture Accreditation Board (NAAB) Student Performance Criteria

The accredited degree program must ensure that each graduate possesses the knowledge and skills defined by the criteria set out below. The knowledge and skills are the minimum for meeting the demands of an internship leading to registration for practice.

The school must provide evidence that its graduates have satisfied each criterion through required coursework. If credits are granted for courses taken at other institutions, evidence must be provided that the courses are comparable to those offered in the accredited degree program.

The criteria encompass two levels of accomplishment:
• *Understanding*— means the assimilation and comprehension of information without necessarily being able to see its full implication.
• *Ability*— means the skill in using specific information to accomplish a task, in correctly selecting the appropriate information, and in applying it to the solution of a specific problem.

The NAAB establishes performance criteria to help accredited degree programs prepare students for the profession while encouraging educational practices suited to the individual degree program. In addition to assessing whether student performance meets the professional criteria, the visiting team will assess performance in relation to the school's stated curricular goals and content. While the NAAB stipulates the student performance criteria that must be met, it specifies neither the educational format nor the form of student work that may serve as evidence of having met these criteria. Programs are encouraged to develop unique learning and teaching strategies, methods, and materials to satisfy these criteria. The NAAB will consider innovative methods for satisfying the criteria, provided the school has a formal evaluation process for assessing student achievement of these criteria and documents the results.

The *APR* must include the following information:

• An overview of the school's curricular goals and content.
• A matrix cross-referencing each required course with the performance criteria it fulfills.

For each criterion, the school must highlight the cell on the matrix that points to the greatest evidence of achievement.

For the purpose of accreditation, graduating students must demonstrate *understanding* or *ability* in the following areas:

1. Speaking and Writing Skills
Ability to read, write, listen, and speak effectively

2. Critical Thinking Skills
Ability to raise clear and precise questions, use abstract ideas to interpret information, consider diverse points of view, reach well-reasoned conclusions, and test them against relevant criteria and standards

3. Graphics Skills
Ability to use appropriate representational media, including freehand drawing and computer technology, to convey essential formal elements at each stage of the programming and design process

4. Research Skills
Ability to gather, asses, record, and apply relevant information in architectural coursework.

5. Formal Ordering Systems
Understanding of the fundamentals of visual perception and the principles and systems of order that inform two- and three-dimensional design, architectural composition, and urban design

6. Fundamental Design Skills
Ability to use basic architectural principles in the design of buildings, interior spaces, and sites

7. Collaborative Skills
Ability to recognize the varied talent found in inter-disciplinary design project teams in professional practice and work in collaboration with other students as members of a design team

8. Western Traditions

Understanding of the Western architectural canons and traditions in architecture, landscape and urban design, as well as the climatic, technological, socioeconomic, and other cultural factors that have shaped and sustained them

9. Non-Western Traditions

Understanding of parallel and divergent canons and traditions of architecture and urban design in the non-Western world

10. National and Regional Traditions

Understanding of national traditions and the local regional heritage in architecture, landscape design and urban design, including the vernacular tradition

11. Use of Precedents

Ability to incorporate relevant precedents into architecture and urban design projects

12. Human Behavior

Understanding of the theories and methods of inquiry that seek to clarify the relationship between human behavior and the physical environment

13. Human Diversity

Understanding of the diverse needs, values, behavioral norms, physical ability, and social and spatial patterns that characterize different cultures and individuals and the implication of this diversity for the societal roles and responsibilities of architects

14. Accessibility

Ability to design both site and building to accommodate individuals with varying physical abilities

15. Sustainable Design

Understanding of the principles of sustainability in making architecture and urban design decisions that conserve natural and built resources, including culturally important buildings and sites, and in the creation of healthful buildings and communities

16. Program Preparation

Ability to prepare a comprehensive program for an architectural project, including assessment of client and user needs, a critical review of appropriate precedents, an inventory of space and equipment requirements, an analysis of site conditions, a review

of the relevant laws and standards and assessment of their implication for the project, and a definition of site selection and design assessment criteria

17. Site Conditions

Ability to respond to natural and built site characteristics in the development of a program and the design of a project

18. Structural Systems

Understanding of principles of structural behavior in withstanding gravity and lateral forces and the evolution, range, and appropriate application of contemporary structural systems

19. Environmental Systems

Understanding of the basic principles and appropriate application and performance of environmental systems, including acoustical, lighting, and climate modification systems, and energy use, integrated with the building envelope

20. Life Safety

Understanding of the basic principles of life-safety systems with an emphasis on egress

21. Building Envelope Systems

Understanding of the basic principles and appropriate application and performance of building envelope materials and assemblies

22. Building Service Systems

Understanding of the basic principles and appropriate application and performance of plumbing, electrical, vertical transportation, communication, security, and fire protection systems

23. Building Systems Integration

Ability to assess, select, and conceptually integrate structural systems, building envelope systems, environmental systems, life-safety systems, and building service systems into building design

24. Building Materials and Assemblies

Understanding of the basic principles and appropriate application and performance of construction materials, products, components, and assemblies, including their environmental impact and reuse

25. Construction Cost Control

Understanding of the fundamentals of building cost, life-cycle cost, and construction estimating

26. Technical Documentation

Ability to make technically precise drawings and write outline specifications for a proposed design

27. Client Role in Architecture

Understanding of the responsibility of the architect to elicit, understands, and resolves the needs of the client, owner, and user

28. Comprehensive Design

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

29. Architect's Administrative Roles

Understanding of obtaining commissions and negotiating contracts, managing personnel and selecting consultants, recommending project delivery methods, and forms of service contracts

30. Architectural Practice

Understanding of the basic principles and legal aspects of practice organization, financial management, business planning, time and project management, risk mitigation, and mediation and arbitration as well as an understanding of trends that affect practice, such as globalization, outsourcing, project delivery, expanding practice settings, diversity, and others

31. Professional Development

Understanding of the role of internship in obtaining licensure and registration and the mutual rights and responsibilities of interns and employers

32. Leadership

Understanding of the need for architects to provide leadership in the building design and construction process and on issues of growth, development, and aesthetics in their communities

33. Legal Responsibilities

Understanding of the architect's responsibility as determined by registration law, building codes and regulations, professional service contracts, zoning and subdivision ordinances, environmental regulation, historic preservation laws, and accessibility laws

34. Ethics and Professional Judgment

Understanding of the ethical issues involved in the formation of professional judgment in architectural design and practice.

APPENDIX E

IDP TRAINING REQUIREMENTS

IDP Training Area Descriptions & Recommended Core Competencies

The activities in this appendix enable you to acquire the knowledge, understanding, and skills that form core competencies related to architectural practice. You should use the activities as a tool to enhance the quality of your training.

Two types of activities—Awareness and Understanding and Skills and Application—are identified for each of the 16 IDP training areas. Awareness and Understanding Activities encompass the technical information, concepts, and principles you can articulate both orally and in writing. They refer to three important reference documents:

Emerging Professional's Companion (EPC) (see Chapter III), *The Architect's Handbook of Professional Practice* (AHPP), 13th edition, and *The Construction Specifications Institute Project Resource Manual–CSI Manual of Practice, 5th Edition* (CSI PRM) (ISBN 0-07-137004-8). The PRM is the authoritative resource for the organization, preparation, use, and interpretation of construction documents, encompassing the entire life cycle of a facility from conception through facility management. Skills and Application Activities involve performance-based tasks that form each core competency.

You may use the information in this appendix in a variety of ways: as a checklist, a set of goals, or a map to identify how far along you are in the process. Given the wide diversity among interns' architectural educations and training settings, achievement of core competencies is not precisely correlated with the minimum training units required in each area. Some interns may achieve their objectives in the minimum required time, while others may require significantly more experience.

At the beginning of your internship, you should familiarize yourself with the training areas and activities. Analyze your current knowledge and practical skills and consider how you can acquire the core competencies most efficiently.

Keep the *IDP Guidelines* with you at work so you can chart your progress. Remember that specific office tasks will often result in competencies in more than one IDP training area. Take care to accurately prorate time among the various areas. Consult with your IDP supervisor regarding the appropriate distribution of time. As your internship progresses, periodically discuss the activities and your particular training objectives with your

supervisor, mentor, and other interns. Because the activities provide a common benchmark, sharing your progress with others can be mutually beneficial.

Category A: Design and Construction Documents

1. PROGRAMMING
2. SITE & ENVIRONMENTAL ANALYSIS
3. SCHEMATIC DESIGN
4. ENGINEERING SYSTEMS COORDINATION
5. BUILDING COST ANALYSIS
6. CODE RESEARCH
7. DESIGN DEVELOPMENT
8. CONSTRUCTION DOCUMENTS
9. SPECIFICATIONS & MATERIALS RESEARCH
10. DOCUMENT CHECKING & COORDINATION

Category B: Construction Contract Administration

11. BIDDING & CONTRACT NEGOTIATION
12. CONSTRUCTION PHASE—OFFICE
13. CONSTRUCTION PHASE—OBSERVATION

Category C: Management

14. PROJECT MANAGEMENT
15. OFFICE MANAGEMENT

Category D: Related Activities

16. PROFESSIONAL & COMMUNITY SERVICE

1. PROGRAMMING

Definition
Programming is the process of discovering the owner's requirements and desires for a project and setting them down in written, numerical, and graphic form. For a project to be successful, all participants, including the owner, must understand and agree on the program at the outset.

Core Competencies

- At the completion of your internship, you should be able to:
- use information gathering and data collection techniques to collect, organize, and evaluate programming data
- establish the scope, design, objectives, limitations, and criteria for building projects
- develop a program that reflects the owner's requirements and desires for a project
- set forth the program requirements in written,
- numerical, and graphic form
- research and assess information from completed post occupancy evaluations
- determine a project's feasibility

Minimum training units required: 10

2. SITE & ENVIRONMENTAL ANALYSIS

Definition
Site and environmental analysis involves research and evaluation of a project's context and may include environmental evaluation, land planning or design, and urban planning.

Core Competencies
At the completion of your internship, you should be able to:
- provide a coherent, logical, well-designed site plan for a specific program
- justify the site plan design based on your research

Minimum training units required: 10

3. SCHEMATIC DESIGN

Definition
Schematic design is the development of graphic and written conceptual design solutions to the program for the owner/client's approval.

Core Competencies
At the completion of your internship, you should be able to:
- develop alternative solutions to a specific program
- document and present your solutions to an owner/client for selection and approval

Minimum training units required: 15

4. ENGINEERING SYSTEMS COORDINATION

Definition
Engineering systems coordination involves selecting and specifying structural, mechanical, electrical, and other systems, and integrating them into the building design. These systems are normally designed by consultants in accordance with the client's needs.
Core Competencies
At the end of your internship, you should be able to:
- work with consultants to incorporate engineering systems into building designs and resolve any building system conflicts
- coordinate inclusion of engineering systems design in all project documents

Minimum training units required: 15

5. BUILDING COST ANALYSIS

Definition
Building cost analysis involves estimating the probable construction cost of a project.
Core Competencies
At the completion of your internship, you should be able to:
- analyze and evaluate site and building construction costs
- prepare a building cost analysis that meets the program's requirements and provides alternatives for the owner/client

Minimum training units required: 10

6. CODE RESEARCH

Definition
Code research involves evaluating a specific project in the context of relevant local, state, and federal regulations that protect public health, safety, and welfare.

Core Competencies
At the completion of your internship, you should be able to:
- provide the owner/client with an analysis of how a project will respond to local, state, and federal regulations and other relevant code issues
- develop a code compliance plan

Familiarize yourself with the information contained in the applicable codes in the jurisdiction in which the project is located; the Americans with Disabilities Accessibility Guidelines; and any other applicable regulatory manuals.

Minimum training units required: 15

7. DESIGN DEVELOPMENT

Definition
In design development, a project's schematic design is refined, including designing details and selecting materials. This step occurs after the owner/client has approved the schematic design.

Core Competencies
At the completion of your internship, you should be able to:
- provide drawings and documents for the owner/client that detail the project's scope, quality, and cost
- select and develop details for specific materials, components, and systems to be incorporated into the design

Minimum training units required: 40

8. CONSTRUCTION DOCUMENTS

Definition
Construction documents are the written and graphic instructions used for construction of the project. These documents must be accurate, consistent, complete, and understandable.

Core Competencies
At the completion of your internship, you should be able to:
- prepare an accurate, consistent, and complete set of architectural construction documents for a project
- explain construction documents to a client
- check and coordinate the integration of structural, mechanical, electrical, and plumbing systems with the building and site

- based on the specifications, prepare a production sequence flow chart to illustrate the relationship between construction documents and the construction process
- when applicable, prepare phasing documents to illustrate the construction sequence

Minimum training units required: 135

9. SPECIFICATIONS & MATERIALS RESEARCH

Definition
Specifications and materials research leads to analysis and selection of building materials and systems for a project. The materials specified for a particular project communicate the requirements and quality expected during construction. Specifications are included in a project manual that is used during bidding and construction.

Core Competencies
At the completion of your internship, you should be able to:
- prepare specifications in accordance with CSI standards by translating the construction requirements into a specifications format
- research and select appropriate building materials based on performance criteria and program requirements

Minimum training units required: 15

10. DOCUMENT CHECKING & COORDINATION

Definition
Document checking and coordination is the means by which quality assurance is established and maintained throughout a project's development.

Core Competencies
At the completion of your internship, you should be able to:
- verify that information produced by the various disciplines involved in the design/construction process is coordinated throughout the project documents
- apply standard document-checking procedures for a project, and revise and correct construction documents, as required

Minimum training units required: 10

11. BIDDING & CONTRACT NEGOTIATION

Definition
Bidding and contract negotiation involves the establishment and administration of the bidding process, issuance of addenda, evaluation of proposed substitutions, review of bidder qualifications, analysis of bids, and selection of the contractor(s).

Core Competencies
At the completion of your internship, you should be able to:
- understand the difference between the bidding and contract negotiation processes
- follow appropriate procedures during the bidding process
- complete bidding and contract forms

Minimum training units required: 10

12. CONSTRUCTION PHASE—OFFICE

Definition
Construction contract administration tasks carried out in the architect's office include facilitating project communication, maintaining project records, reviewing and certifying amounts due contractors, and preparing change orders (also see Training Area 13, Construction Phase-Observation).

Core Competencies
At the completion of your internship, you should be able to:
- understand the relationship between construction documents and the construction contract administration process
- organize and manage contract administration tasks during the construction phase
- follow appropriate administrative procedures during the construction phase
- facilitate communication among all participants in the construction process, including the owner/client

Minimum training units required: 15

13. CONSTRUCTION PHASE—OBSERVATION

Definition
Construction contract administration tasks carried out in the field include observing construction for conformance with drawings and specifications and reviewing and certifying amounts due to contractors (also see Training Area 12, Construction Phase-Office).

Core Competencies
At the completion of your internship, you should be able to:
- understand the relationship between construction documents and the construction contract administration process
- manage field observation and documentation tasks
- evaluate completed construction for compliance with the construction documents and specifications

Minimum training units required: 15

14. PROJECT MANAGEMENT

Definition
Project management includes planning, organizing, and staffing; budgeting and scheduling; leading and managing the project team; documenting key project information; and monitoring quality assurance.

Core Competencies
At the completion of your internship, you should be able to:
- coordinate communication among all parties involved in a given project
- manage contracts, personnel, schedule, and budget throughout all phases of a small project
- administer agreements with the owner/client and consultants
- maintain project quality during design and construction

Minimum training units required: 15

15. OFFICE MANAGEMENT

Definition
Office management involves allocation and administration of office resources to support the goals of the firm.

Core Competencies
At the completion of your internship, you should be able to:
- identify and articulate the activities required to maintain a successful and healthy office environment in an architecture firm

Minimum training units required: 10

16. PROFESSIONAL & COMMUNITY SERVICE

Definition
Interns will find that voluntary participation in professional and community activities enhances their professional development. Such activities will increase your understanding of the people and forces that shape society, as well as augment your professional knowledge and skills. Community service does not have to be limited to architecturally related activities for you to receive these benefits.

Core Competencies
At the completion of your internship, you should be prepared to:
- contribute your talents responsibly in a traditional or nontraditional community-based organization with the goal of helping to improve the quality of life in the community

Minimum training units required: 10

APPENDIX F

ACCREDITED ARCHITECTURE PROGRAMS

	D. Arch.	M. Arch.	B. Arch.	Institution
1		✓		Academy of Art University
2		✓		Andrews University
3		✓		Arizona State University
4			✓	Auburn University
5		✓		Ball State University
6		✓	✓	Boston Architectural College
7			✓	California College of the Arts
8			✓	California Polytechnic State University, San Luis Obispo
9		✓	✓	California State Polytechnic University, Pomona
10			✓	Carnegie Mellon University
11			✓	City College of the City University of New York
12		✓		Clemson University
13		✓		Columbia University
14			✓	Cornell University
15			✓	Dreel University
16			✓	Drury University
17		✓	✓	Florida A&M University
18			✓	Florida Atlantic University
19		✓		Florida International University
20		✓		Frank Lloyd Wright School of Architecture
21		✓		Georgia Institute of Technology
22		✓		Hampton University
23		✓		Harvard University
24			✓	Howard University
25		✓	✓	Illinois Institute of Technology
26		✓	✓	Iowa State University
27		✓		Judson University
28		✓		Kansas State University
29		✓		Kent State University
30		✓		Lawrence Technological University
31		✓	✓	Louisiana State University
32		✓		Louisiana Tech University
33		✓		Massachusetts College of Art
34		✓		Massachusetts Institute of Technology
35		✓		Miami University

36	✓	✓	Mississippi State University
37	✓		Montana State University
38	✓		Morgan State University
39	✓	✓	New Jersey Institute of Technology
40		✓	New York Institute of Technology
41	✓	✓	NewSchool of Architecture
42	✓	✓	North Carolina State University
43	✓		North Dakota State University
44	✓		Northeastern University
45	✓		Norwich University
46	✓		Ohio State University
47		✓	Oklahoma State University
48	✓		Parsons School of Design/New School University
49		✓	Pennsylvania State University
50		✓	Philadelphia University
51		✓	Polytechnic University of Puerto Rico
52	✓		Prairie View A&M University
53	✓	✓	Pratt Institute
54	✓		Princeton University
55	✓	✓	Rensselaer Polytechnic Institute
56	✓	✓	Rhode Island School of Design
57	✓	✓	Rice University
58	✓		Roger Williams University
59	✓		Savannah College of Art and Design
60	✓	✓	Southern California Institute of Architecture
61		✓	Southern Polytechnic State University
62		✓	Southern University and A&M College
63	✓		State University of New York at Buffalo
64	✓	✓	Syracuse University
65		✓	Temple University
66	✓		Texas A&M University
67	✓		Texas Tech University
68	✓		The Catholic University of America
69		✓	The Cooper Union
70	✓		Tulane University
71	✓		Universidad de Puerto Rico
72		✓	University of Arizona
73		✓	University of Arkansas
74	✓		University of California at Berkeley
75	✓		University of California at Los Angeles
76	✓		University of Cincinnati
77	✓		University of Colorado at Denver

78	✓		University of Detroit Mercy
79	✓		University of Florida
80	✓		University of Hawaii at Manoa
81	✓	✓	University of Houston
82	✓		University of Idaho
83	✓		University of Illinois at Chicago
84	✓		University of Illinois at Urbana-Champaign
85	✓		University of Kansas
86		✓	University of Kentucky
87	✓		University of Louisiana at Lafayette
88	✓		University of Maryland
89	✓		University of Massachusetts-Amherst
90	✓	✓	University of Miami
91	✓		University of Michigan
92	✓		University of Minnesota
93	✓		University of Nebraska
94	✓		University of Nevada, Las Vegas
95	✓		University of New Mexico
96	✓	✓	University of North Carolina at Charlotte
97	✓	✓	University of Notre Dame
98	✓	✓	University of Oklahoma
99	✓	✓	University of Oregon
100	✓		University of Pennsylvania
101	✓		University of South Florida
102	✓	✓	University of Southern California
103	✓	✓	University of Tennessee, Knoxville
104	✓		University of Texas at Arlington
105	✓	✓	University of Texas at Austin
106	✓		University of Texas at San Antonio
107	✓		University of Utah
108	✓		University of Virginia
109	✓		University of Washington
110	✓		University of Wisconsin-Milwaukee
111	✓	✓	Virginia Polytechnic Institute and State University
112	✓		Washington State University
113	✓		Washington University in St. Louis
114		✓	Wentworth Institute of Technology
115		✓	Woodbury University
116	✓		Yale University

APPENDIX G

Sample Project Statement

Studio Project No. 1

A HISTORIC PRESERVATION RESEARCH LIBRARY COMPLEX

Project Statement
A trustee of a major university has donated a site and funds to that institution for the development of a historic preservation research library complex. The site is now part of the university campus, and is improved by one building of historic significance and, until recently, several nondescript structures. The university is located in a city with a population of 165,000. The campus serves 14,000 students, 85% of whom live on or near the campus. The college of environmental design has recently instituted a graduate degree program in historic preservation.

The site is excellent for its proposed use, since it provides a view of the campus commons, bell tower, and several of the original buildings. The site is adjacent to the College of Environmental Design. The campus development is considered an outstanding example of the marriage of historic structures and sympathetic contemporary design. The architecture of the recently constructed building clearly reflects a sensitivity to the university's past architecture while expressing the image of today's and allowing for a continued statement into the future.

Access to the site will be primarily pedestrian, from both on and off campus, from public transportation, and from existing parking areas. Handicapped and staff parking are provided on the surface lot next to the site.

The historic preservation research library complex will be composed of three major elements:

A. The restored Town Hall will be used for lectures and conferences; it will function independently and in conjunction with one or both of the other areas. (It should be noted that the other structures that existed on the site have been razed, and the existing trees have been saved.) This building is a one-story building with a heavy rusticated gray stone exterior with minimal fenestration and a steeply pitched slate roof.

B. A new preservation research library facility. This building, outlined in the program to follow, will house books, periodicals, plans, prints, and samples of historic building elements as well as providing work space, administrative offices and an exhibit hall.

C. An outdoor courtyard space, accessible from the Town Hall and the library space will be used for the display of permanent weather resistive exhibits and should visually and functionally unify the existing and proposed buildings on the site.

It is anticipated that the complex will be used primarily by faculty and students of the College of Environmental Design, particularly those involved in the new preservation program. The new building is expected to be a major national depository of preservation research material and will therefore be used by scholars, preservationists, and design professionals from throughout the country.

Site Description Site Location Map

A. Topographic
The site is bordered on the north by the campus commons, on the east by the College of Environmental Design and on-campus parking, on the south by light commercial and multi-family housing, and on the west by the University Administration Building. The site is basically flat but slopes gradually down from north to south.

B. Soil and Sub-Surface Conditions
Should be determined based on your selected site

C. Utilities
Underground gas, power, water, sanitary sewer, storm sewer, and telephone services are readily available.

D. Storm Drainage
The building's roof and the site's surface drainage shall be to the city storm sewer system located along the curb line on the south side of the site.

Code Requirements

A. General
The requirements for protecting life, health, and safety and for minimizing property damage must be incorporated into your solution.

   B.   Fire Ratings and Exiting Requirements
          1.   A fire-resistive construction system is required, (concrete or protected steel). Automatic sprinkler systems are not to be incorporated because of potential accidental damage to books and other fragile material.
          2.   Spaces containing central gas-fired heating equipment require a two-hour fire separation from the remainder of the building.
          3.   Elevator and mechanical chases shall have two-hour fire rated walls.
          4.   The Fire Marshal has determined that all levels of any campus building in excess of 1,000 sq. ft. in area must have a minimum of two means of egress in addition to any monumental stairs. Dead end corridors shall not exceed twenty feet. The maximum distance to an exit stair in any building more than one story in height and in excess of 3,000 sq. ft. on the first floor, shall be 100 ft.

Climate
   A.   Summer: To be determined based on selected site.
   B.   Winter: To be determined based on selected site.
   C.   Precipitation: To be determined based on selected site.
   D.   Sun Angles: To be determined based on selected site.

Energy Use and Conservation
The owner desires that the building be as energy efficient as possible in all seasons. Building orientation and form, shading, use of natural lighting and energy efficiency must be considered and incorporated into the design.

Maximum consideration should be given to the following:
   a.   Sun
   b.   Wind
   c.   Light
   d.   Water
   e.   Ventilation

Program Requirements
   1. Site Circulation:
          1.   Public transportation (buses) service on University Drive.
          2.   Automobile Circulation.
                   b.   Public parking facilities located east and west of the site on

University Drive.
    c. On-campus parking for staff, faculty, selected visitors, and handicapped persons located immediately east of site.
3. Service--Service access to site shall be from Euclid Mall or College Mall, controlled by removable bollards.

2. Building-Research Library Facility:

Space requirements indicated are net square feet. Gross building square footage shall not exceed net square footage by more than 25 percent.

I. Ground Level

1. Entrance Lobby   1,000 SF MIN
    Provide information desk located for visual control of stairway, elevator and entrance to, exhibit hall and entrance to physical research area. Used for waiting, circulation, and public telephones.

2. Exhibit Hall   4,000 SF
    Clear span space with an 18' clear ceiling height. Public access from entrance lobby only. Natural lighting should be considered by the use of fenestration, clerestories or skylights. Provide service access for receiving large exhibits. (Loading dock not required.)

3. Administration   500 SF
    Accessible from the entrance lobby area. The space would house the administrator's office, administrative aide, and conference room. (The layout of these spaces is not required.)

4. Physical Research Area   3,000 SF
    Controlled access from entrance lobby
      b. Studio-Laboratory   (1,500 SF)
        Control /office and general study space for analysis of samples of historic building materials and artifacts.

      c. Archival Collection Room   (1500 SF)
        Used for the storage of samples of historic building materials and artifacts.
5. General Work Space   2,000 SF
    to include areas for:
      a. Shipping /receiving, refuse area. (300 SF)

(Loading dock not required.)

    b. Sorting and cataloging   (700 SF)
    c. Work room   (1,000 SF)

6. Public Toilets   450 SF
Easily accessible to all ground floor functions; fixture layout not required.
    b. Men's   (200 SF)
    c. Women's   (200 SF)
    d. Janitors   (50 SF)

7. Building mechanical /electrical   1,000 SF
    Total   **11,950 SF**

II.   Second Level
1. Research library   7,500 SF
(A non-circulating research library. All material to remain in library.)
    a. Control Area   (50 SF)
       Check desk for security control of research library.
    b. Library Administration   (450 SF)
       This space would include the librarian's office, the assistant librarian's (archivist) office, and the library work space. (The layout of these spaces is not required.)
    c. Reading Room   (2,100 SF)
    d. Open Stack Space   (3,500 SF) For books, periodicals, prints, plans.
    e. Archival Research   (1,000 SF)
       Secured space for rare manuscripts, prints and plans. Limited access controlled by staff. Archival research should be adjacent to Library Administration for control and access.
    f. Microfilm and Copy Center :   (400 SF)
       (to be located within controlled area)
2. Public Toilets   450 SF
3. Easily accessible to all second level functions, fixture layout not required.
    a. Men's   (200 SF)
    b. Women's   (200 SF)
    c. Janitors   (50 SF)

Total		**7,950 SF**

III.   General

1. Elevators
   a. One public elevator, hydraulic 5x7 platform size (no escalators).
   b. One key-operated service elevator, hydraulic 5x7 platform size from general work space area to stack space or library work space.

2. Stairs
   a. Exit stairs as required. Monumental stair to research library from entrance lobby.

C. Courtyard:

The courtyard space should be an outdoor area designed to visually and functionally connect the new Research Library Building with the restored Town Hall, thus creating the site as a new complex within the framework of the university. The space should employ a combination of "hard" and "soft" surfaces and be suitable for pedestrians walking through the courtyard as well as for individuals sitting, studying or relaxing. The courtyard shape, size, and square footage are at the designer's discretion.

Required Drawings - (minimum)

1. **Site Plan/Ground Level Plan:** Scale 1/16"=1'-0"
   Show building floor plan, label all spaces. Show windows and doors, stairs, elevators, etc.

   Indicate design of courtyard. Indicate pedestrian walkways and landscaping. Show service entrance(s).

2. **Second Level Plan:** Scale 1/16"=1-0" Label all spaces. Show windows and doors, stairs, elevators, etc.

3. **Two contiguous elevations:** Scale 1/16"   =1-0". Indicate and label materials, fenestration and all elements necessary to show building design. Draw the two contiguous elevations that best demonstrate the design intent.

4. **Two building Section:** Scale 1/16" = 1'-0" Cut section to show significant spaces

in building. Section must be taken to include the exhibit hall and adjacent space.

5. **Project model:** Scale 1/16" = 1'-0" 3D model that thoroughly illustrates the scope and intent of your design solution. The model should allow for a clear illustration of the contextual relationship of your project to the site and adjacent structures. <u>The use of a shared context model that allows each student to drop in their individual project is encouraged.</u>

6. **Two experiential views:** This perspective view should capture the essence of the project as a whole.

   Indicate the following:
   a. Structural systems including all footings and foundation walls showing structural grid/organizing system
   b. Building materials
   c. Provisions for heating and cooling system. (Space for ducts etc. -note mechanical systems concept.)
   d. Vertical dimensions

   Note: Section should delineate use of natural light, energy conservation methods and appropriate scale of spaces. Your final design solution should be strongly tied to the regional context in which your building is placed. Utilization of regional design techniques in conjunction with emerging design strategies will be fundamental in arriving at a sound design solution. The drawings should express any building design qualities, not shown in plans or elevations, deemed necessary to express design intent.

VITA

Address:	Keith Thomas McPeek P.O. Box 523, Carterville, IL 62918 ktmcpeek@tamu.edu
Education:	Ph.D., Architecture, Texas A&M University, 2009 M. Arch., Architecture, Texas A&M University, 1997 B.S., Environmental Design - Architecture, Ball State University, 1995
Experience:	Southern Illinois University, Assistant Professor, 2007 to present Cooper Carry & Associates, Designer / Delineator, 2005 to 2007 University of Wyoming, Assistant Professor, 2004 to 2005 Texas A&M University, Assistant Lecturer, 2002 to 2004 Savannah College of Art and Design, Professor, 2001 to 2002
Awards/Honors:	Phi Kappa Phi, Honor Society, 2004 Lindbergh MARTA Station design competition team, 1998 MicroStation – Bentley student design competition, 1997 Texas Society of Architects digital design charrette, 1996 AEC Systems visualization gallery, 1996 ICAC - interdisciplinary studio prototype, 1994
Service:	AIA Georgia Legacy Charette, Faculty Advisor, 2002 Guest Lecture, Indiana Historic Landmarks Found., Organizer, 2002 Institutional Advancement and Community Service, member, 2002 Boyer Report panel participant, Carnegie Foundation for Educ., 1995
Presentations:	Teambuilding through Collaborative Engagement in a Creative Environment presented at the Art of Management Conference at The Banff Centre, September 9-12, 2008 Extending the Mission of the Design Studio through Collaborative Engagement presented at Education for an Open Architecture Conference at Ball State University – October 19-22, 2008