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PATTERNS OF CHANGE AND LEARNING IN THE PRACTICES

OF SELECTED OKLAHOMA ARCHITECTS

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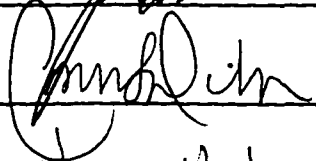
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A DISSERTATION
APPROVED FOR THE DEPARTMENT OF
EDUCATIONAL LEADERSHIP AND POLICY STUDIES

By

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Few things in life have brought more pleasure to me than the pursuit of this degree. This quest has guided my life and sustained my sanity for the past nine years, and now as it comes to an end I need to take this brief moment to reflect with great pride on my achievement and recognize those persons without whose help this would never have been possible.

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This dissertation is dedicated to the memory of Maybelle Blaine, who started me on this path so many years ago.

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ABSTRACT

This study examined the role of learning in the process of change in professional practice among a selected group of twenty-seven architects. It identified paterns of change and learning and discovered theories explaining those patterns. The study used a qualitative approach similar to the study of change and learning among physicians conducted by Fox, Mazmanian, and Putnam. The method of inquiry and analysis followed Straus and Corbin's recommendations for grounded theory research. Through face-to-face interviews architects described recent changes in their professional practices and why and how they had made them.

Findings included the following: Architects most often used learning as a means of making incremental adjustments in practices. Most learning was self-directed and involved informal resources and methods. Formal learning was found in only 14% of cases. Learning most often occurred during the course of working on projects and focused on finding solutions to immediate problems. Changes were driven by forces from within the profession, the firms for whom the architects worked, society, and the personal desires of the architects. Professional forces were most likely to lead to change and learning. Personal

forces were most likely to lead to major changes involving long-term learning efforts. Patterns of change and learning at the conceptual level were similar to those discovered in the study of physicians; however, substantive differences between professions were also found. Among these were the role firms play in shaping the changes and strategies for learning among architects and the architects' reliance on anecdotal knowledge.

Implications for educators are that experience serves as the organizing principle for learning in professional practice and that customs and work conditions peculiar to each profession ultimately color the process of change and learning.

PATTERNS OF CHANGE AND LEARNING IN THE PRACTICES

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CHAPTER I

OVERVIEW OF STUDY

Introduction

Vitruvius Pollio, a first century BC Roman architect and engineer, defined

the three conditions for good architecture as *Firmness, Commodity* and *Delight*

(Plommer, 1973). By this he meant buildings should be structurally sound,

suitable for their purpose, and aesthetically pleasing. This essentially describes

the professional responsibilities of practicing architects today. Architects face

another equally important, although less implicit, responsibility, as well. They

must continually make appropriate changes in their practices that preserve and

advance their ability to achieve Vitruvius's admonition. While a great many

books and articles have been written about the philosophies, procedures, and

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works of architectural practice, very little attention has been given to how and why changes in practice occur.

Architecture is in a state of unprecedented change; thus, the need to understand change is far greater than in the past. Recently educational research has begun to clarify the nature of change among professionals and the critical role learning plays in this process (Fox & Bennett, 1996); however, until this study no complete theory of change and learning had been developed for architects. This was problematic as the need to efficiently adopt new knowledge, skills and paradigms of practice has been continuously increasing in response to increasing rates of change. It was further problematic in the context of the poorly developed infrastructure for continued learning in the architectural profession.

Architects have for much of this century maintained expertise on an *ad hoc* basis through experiences related to building projects upon which they work (Cuff, 1991; Jones, 1989). This is consistent with the tradition of unstructured apprenticeship as the path to induction into the profession. Architects have often reported learning primarily through experiential means with much of the knowledge gained embedded in proprietary project documents (Burnnett, 1979; De Monchaux, 1993).

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In the late 1960s and early 1970s, the energy crisis and a growing cynicism of professions in general gave rise to a concern that architects might need help in maintaining expertise. However, the focus at that time was on the architects' access to information rather than systems of reeducation (Burnette, 1979). This reflects what Cervero (1988) refers to as a fundamentalist perspective that views practice as a relatively stable process, somewhat like a mathematical formula, that only requires the insertion of updated facts and figures.

In the late 1970s and into the 1980s, the profession began to question whether experience and information access alone would be sufficient to maintain professional expertise. Architects were facing rapid advances in building technology and increasing litigation. There were also growing concerns for seismic safety, the environment, historical preservation, and building accessibility for persons with disabilities. Personal design philosophies were also being questioned as the overarching design paradigm of *modern architecture* was falling from grace both within and without the profession (Blake, 1977; Wolfe, 1981). The profession responded by changing the focus on information access to the broader concept of learning. The American Institute of Architects initiated a review of all phases of the architect's

education, including education beyond induction into practice. The Institute officially endorsed lifelong learning as a professional responsibility and set in motion efforts to require architects to continue their formal education.

Today practicing architects face even greater forces for change as the issues of the 1980s have intensified and new issues have emerged. General environmental concerns have come into clear focus in the form of indoor air quality, "green architecture", environmental impact, and sustainable development. Building codes and regulations, such as the far reaching Americans with Disabilities Act, have become more numerous and complex, and the use of information technologies in the workplace is rapidly accelerating. Architects are also initiating changes in their practices in order to reverse a perceived erosion of influence in the building process and society as a whole. Leaders in the profession are urging their colleagues to take greater responsibility for their work, expand their services, give greater attention to client needs, and redirect their practices toward solving community problems (Boyer & Mitgang, 1996; Chong, 1996).

Clearly architects are in the midst of unprecedented and profound change. As Thomas Fisher, former editor of Progressive Architecture magazine, recently observed:

"Having spent months talking to many people in this field, I think it is clear that the profession is undergoing tremendous change. But it is changing in a lot of different directions at once, suggesting that the profession in the future will be more diverse and more fragmented than in the past (Fisher, 1994, p. 45)."

In response to these challenges, a greater emphasis on learning has emerged in the profession. Architectural firms have increased their efforts to train and develop their employees (Woodward, 1990a). The National Council of Architectural Registration Boards has endorsed policy requiring an accredited architecture degree for licensing and has initiated a professional development verification program; and, the American Institute of Architects and several state licensing boards have implemented continuing education requirements (Carter, 1996; Lowther, 1995; McKee, 1994).

Although this new emphasis on learning has encouraged some recent research in architectural continuing education (Gruenwald, 1995; Price & Knowles, 1995; Spencer, 1996), architecture remains the least studied of the professions, and the providers of architectural continuing education remain the least informed. There are two dimensions to this problem. First, the primary learning resources used by architects - colleagues, trade journals, product representatives, and local and national programs of the American Institute of Architects (Burnette, 1979; Bilello & Woodward, 1992) - typically lack basic

expertise in adult education. Architectural schools, in contrast to their medical counterparts, rarely provide learning opportunities for practicing architects and, rarer still, involve adult educators (Bilello, 1993). In an attempt to address this lack of fundamental educational knowledge, the American Institute of Architects recently established an annual Continuing Education Institute to develop a nucleus of expertise within the profession. While filling a critical need, this effort did not address the second dimension to this problem, which is the lack of knowledge of how and why architects learn and use learning to make changes in their practices.

Educational providers are being called upon to respond to the major changes currently affecting the profession. Merely providing architects information as in the past or improving training procedures will not be sufficient. These providers must have practical knowledge and substantive theory specifically relevant to change and learning in the core areas of architectural practice.

The importance of understanding change and learning is not limited to architecture. Although change is fundamental to the purposes and practices of all continuing professional education, it is rarely the focus of educational research. Most studies are only concerned with change as a measure of the

success or failure of formal educational interventions. The assumption being that change should result from learning and that learning results primarily from instruction, if properly implemented. The abundance of evaluation studies within adult education literature attests to this paradigm. Unfortunately, studies of this type have yielded inconsistent results (Davis et al, 1992; Lloyd & Abrahamson, 1979; Sibley et al, 1982). The findings were about equally divided as to whether continuing education brings about change in professionals or not. Thus, continuing professional education practitioners were left to practice what Long (1983) referred to as the *art* of program planning.

A recent paradigm emerged in which learning was viewed within the process of changing and from the perspective of individual professionals involved. Researchers adopting this view attempted to discover how and why professionals make changes and thereby uncover the role formal and informal learning may or may not play in the process. To date most studies of this type have been conducted among physicians, the first and most extensive being the Physician Change Study commissioned by the Society of Medical College Directors of Continuing Medical Education (Fox et al, 1989). While these studies have resulted in substantive theories and propositions informing continuing medical education, additional studies with other professionals are

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needed in order to develop formative theory that may be more broadly applied.

A study similar in concept and design to that of the Physicians' Change Study was attempted with architects in 1992 although the results were never fully analyzed or reported (Gruenwald, 1995; Price et al, 1993). The purpose of that study was to extend the generalizability of the Physicians' Study to other professions and gather practical information about learning in architecture. Interview protocols and analytical methods borrowed from the physicians' study were only altered to reflect the most obvious differences in the practice content of the two professions. The researchers asked the architects essentially the same questions and attempted to place all responses within the same categories established in the study of physicians. They found that much of the data collected from the architects could be placed within the existing categories and could support basic propositions (Price & Knowles, 1995). Consistent concepts included the following: change most often involved new learning, learning was most often informal and related to professional motivations, and the intensity of learning varied with the degree of change and type of motivation. Significant differences between the two professions were also found, however.

Unlike the physicians, many architects in the study had great difficulty in describing changes in the first person (Gruenwald, 1995; Price & Knowles,

1995). They continually referenced their firms rather than themselves as the entity that underwent a change. These cases were labeled by the researchers as "we changes". De Monchaux's (1993) study of learning organization theory in architectural firms provides additional evidence for this phenomena. She found that theories concerning the need to develop team learning and shared visions within organizations naturally existed in the relatively small architectural and planning firm environments that she studied. She hypothesized that employee self selection into these firms, their close proximity in the work place, and the tradition of team work in architecture accounted for the close identity of employees to their firms.

Another important difference between the physicians' and the architects' studies was the concept of the economy as a unique force for change (Price & Knowles, 1995; Price et al, 1993). This category did not emerge in the physician study except to the extent that some physicians wished to improve their income, for which they expressed a personal and positive attitude (Fox et al, 1989). Among the architects however, the economy very often was cited as a major force for change with a much broader dimension. Interestingly, architects' attitudes toward economic forces tended to be neutral whether the economy was up or down. This suggested to Price and Knowles (1995) that

architects may have a relationship to the economy similar to that of fishermen to the sea. That is, the economy can provide fulfillment and work or it can be barren and treacherous, but it is an inalterable condition of professional life. This concept is reflected in Larson's (1993) analysis of changes in architects' design styles and conceptions of practice, which she attributes to the effects of the economy.

As with the "we change" phenomena, the economic category could not be further explored due to the restrictions of the study format. Consequently, the past attempt to expand theoretical propositions from the medical profession to the culture of architecture has not been entirely successful, and has not produced propositions explaining changing and learning in architecture.

The Problem

The architecture profession has been facing unprecedented change with little knowledge or theory as to the nature of the process through which architects make changes in practice. Specifically, no theory grounded in the core areas of architectural practice existed prior to this study. Additionally, the majority of providers of architectural continuing education have no formal training in adult education and have no knowledge beyond their immediate

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personal experiences as to the nature of learning and change among architects. These persons and institutions have a practical need for applicable knowledge of what and how architects learn and how that learning contributes to changes in practices.

Purpose of the Study

In the absence of an existing theory of change and learning among architects, this study sought to discover theory. This was accomplished by qualitatively analyzing cases of change among architects collected through interviews. This approach revealed tendencies concerning the use of learning resources, the motivations for change and learning, the relationship of these dimensions to change outcomes, and the structure of the change process.

The study focused on changes associated with the design and management of building projects within the architects' practices. These activities represent the core areas of practice and are distinct from activities such as marketing and management, which may be instrumental to practice but do not define the profession nor are engaged in by a majority of architects.

In order to discover theory explaining the relationship of change and learning among architects, the study sought answers to the following specific

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questions:

1. What design and project management practices have architects recently changed?

2. What learning activities, learning resources, motivations, attitudes, time sequences, and outcomes were associated with these changes?

3. What difficulties related to learning or change were encountered?

4. What are the patterns of learning among architects and the associations of those patterns with changes in their practices?

Significance of the Study

The study provides both practical and theoretical benefit and contributes to the body of knowledge concerning theory and practice of architectural continuing education. Insights into the uses and preferences of learning resources, areas of learning need, and the forces that motivate architects to change and engage in learning serve a variety of individuals and organizations. Currently a growing number of state regulatory boards are considering continuing education requirements for relicensing architects to practice (Carter, 1996). Typically, the criteria for mandatory continuing education are based upon assumptions that participation in classroom instruction will insure competency, yet no definitive evidence exists to support this assumption (Little, 1993; Nowlen, 1988; Young & Willie, 1984). Findings from this study provide

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a better rationale for criteria selection as well as the decision to implement such policy. Such has been the case with the Physicians' Change Study which has served as the basis for the design of the Maintenance of Competence Program of the Royal College of Physicians and Surgeons of Canada (Parboosingh & Thivierge, 1993).

Recently the American Institute of Architects, which represents approximately half of the estimated 90,000 architects in the United States (The American Institute of Architects, 1994), made participation in continuing education a requirement for membership (Carter, 1996; McKee, 1994). The primary mission of this policy was to support meaningful change in the profession (Price, 1993). The design and initial criteria of the program were based upon the findings of the Physicians' Change Study with considerations for the architectural culture. Data and analysis from this study provide AIA with evidence for supporting or adjusting the criteria and policies.

The mandatory continuing education policies of state regulatory boards and the AIA have stimulated a growth in continuing education programs and providers. Increasing numbers of architectural firms are implementing human resource development plans; and, many building product manufacturers and trade associations are developing educational activities for the architectural

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community.

This study provides these groups with critical information about learning in architecture at a time when they will be most receptive and in need of the information.

The findings of this study also inform architectural schools as to effective means to educate architectural students to the realities of practice and to help students develop skills to manage their own future learning in practice. The need for this integration of practice and academia is one of the central themes of a highly publicized report on the state of the architecture profession prepared by Ernest Boyer and associates (AIArchitect, 1996; Boyer & Mitgang, 1996). For many decades faculty in architecture schools have espoused a theory that students learn the abstract principles of design in school and learn realities of practice in the work place. By understanding how learning is embedded in practice, faculty can develop curricula that provides a more seamless entry into the profession.

This study also contributes to the building of formative theory among the professions by expanding existing knowledge of change and learning. Currently only continuing medical education has developed a theory and knowledge base of change and learning to any significant extent. By studying the profession of

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architecture, which stands in sharp contrast to that of medicine, the limits of applicability of the physician model are more clearly identifiable. The knowledge discovered in this study, both theoretical and practical, benefits each of the professions as they attempt to cope with their own conditions of change.

Definition of Terms

Architect: An individual entitled by law to call herself or himself an architect. Typically, a person who has achieved the following: a five year bachelor or a three year master of architecture degree from a school accredited by the National Architectural Accreditation Board, a three year period of internship under the supervision of a licensed architect, and a passing grade on the national Architectural Registration Exam.

Architecture: The art and/or science of building.

Change: "...a difference from what was - an alteration in feeling, thought, or action." (Fox et al, 1989, p. 1)

Continuing Professional Education (CPE): Educational activities provided for professionals beyond initial preparation and entry into the profession. Also, the discipline and body of educators concerned with continuing

education and learning within the professions.

Formal Learning: Educational activities typically planned, developed and directed by persons other than the learner. Usually involves traditional learning resources such as seminars and classroom instruction.

Informal Learning: Learning that results from casually or tacitly planned activities by the learner. Usually involves a variety of non traditional learning resources such as talking with colleagues and business associates and reading trade and popular publications.

Learning: For the purposes of this study learning primarily refers to intentional actions directed toward acquiring a specific knowledge or skill.

Patterns: In this qualitative study patterns refer to repeated relationships between properties and dimensions of categories, which represent related incidents identified in the data (Strauss & Corbin, 1990, p.130).

Professional: One who belongs to the archetypical professions such as ministry,

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law, professorate, and medicine (Kimball, 1992) and to those vocations that possess similar traits and public status such as engineering, accounting, pharmacy, and architecture.

Assumptions

The following four assumptions guided the study. First, the architects interviewed responded in a sincere and forthright manner and were able to provide an accurate account of past change experiences. Second, through my training and experience as a licensed practicing architect, I was able to accurately interpret the meaning of architectural terms and references to practice situations contained in the interviews. Third, personal accounts of change and learning are appropriate data from which to construct theory. This assumption was supported by the following argument:

> "In the social/behavioral sciences, however, the class of phenomena typically addressed in inquiry has no reality in the physical sense. The phenomena we deal with cannot be touched, seen, tasted, smelled, or heard. That is not to say that tangible objects, events, and processes do not enter into human behavior, for example, to shape it. However, it is not these tangibles that we care about, but the meaning and interpretation people ascribe to or make of them, for it is these constructions that mediate their behavior. These constructions do not have reality but exist only in the minds of people (Guba and Lincoln, 1982, p. 239)."

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Fourth, this study assumed that architecture is a true profession. Sociologists and historians writing about professions have often omitted architecture from their studies (Bledstein, 1976; Hughes, 1973; Kimball, 1992). This omission may be the result of the profession's relatively small size rather than a lack of professional legitimacy; although, Glazer (1974) made distinctions between the primary and "lesser" professions, of which architecture was considered in the latter category. On the other hand, several scholars of the professions have recognized architecture as a "major" profession. Larson (1977) has written extensively about architecture in her discourses on the professions, and McGlothlin (1964) included architecture in his comparative study of professional education. Cuff's history of architectural practice revealed that architecture, while less noticed by historians, developed on a parallel path to the classic professions of ministry, law, and medicine (Cuff, 1994). For that reason, as well as my own experiences as an architect, I felt comfortable in assuming architects possess the characteristics and beliefs unique to the professional ideal in America.

Summary

As professionals, architects have responsibilities to the public and their colleagues to maintain high standards of practice. Often this requires them to make changes in their practices, and often these changes require learning new skills and knowledge. In the past architects made changes on an ad hoc basis with little attention given to the process of learning. Over the last three decades the practice of architecture has faced a progressively increasing array of forces for change. Past educational efforts to address these changes have primarily involved the dissemination of information with little regard for the process of learning. However, the rate and nature of change today has forced the profession to reassess its past laissez fare attitude.

The lack of a systematic and robust infrastructure for learning within the profession is now being addressed. Several state governing boards and the American Institute of Architects have implemented new policies requiring architects to participate in formal continuing education. Increasing numbers of architectural firms are implementing training and development policies, and a wide variety of providers, which include schools, professional associations, private entrepreneurs, building industry manufacturers, and software companies are offering architects a growing number of educational opportunities.

Unfortunately, few of these providers have formal training in adult education, and very little literature in architecture is available to guide them.

Even less knowledge exists about the process of change and its relationship to learning among architects. One recent study of change and learning in architecture held the potential to inform the profession but fell short of that mark due to methodological problems and the narrow scope of its findings. Left without a basic framework of understanding of change and learning, policy makers and program developers have only their assumptions about education and trial-and-error methods to guide them in their efforts.

The paradigm of change and learning is also important to other professions and to the body of knowledge in the emerging field of continuing professional education. A landmark study of change and learning among physicians was conducted by Fox, Mazmanian, and Putnam (1989). It offered theories and propositions as to the nature of change and learning among physicians and serves as a framework for future research. Its application to architecture or other professions was, however, unclear. The aforementioned study in architecture attempted to some degree to verify the theories of the physicians' study. While similarities were found between architecture and medicine, differences emerged that could not be adequately subsumed by the

physician model. These differences appear to be related to variations in the cultures of the two professions. As Nowlen posited, the culture of a profession critically influences learning and performance of members within that profession. Thus a substantive theory of change and learning in architecture needed to be developed from the within the profession.

This study provides both practical and theoretical benefit. It informs the emerging infrastructure for architectural continuing education as to the processes by which architects make changes in practice and the relationships of learning to them. Program developers and policy makers have a rationale for designing effective and efficient learning events and establishing appropriate educational standards. Architects too can be informed as to ways in which they can better plan their own learning and professional development activities.

In architecture there is an often stated truism that "form follows function." All too often continuing professional education has assumed the opposite, that change (function) follows learning (form). In actuality, there may be a dynamic interaction of form with function, both in architecture and education. The purpose of this study has been to discover hypotheses that help us understand these phenomena.

CHAPTER II

REVIEW OF LITERATURE

Theory has been defined by Kerlinger (1973) as, "... a set of interrelated constructs, definitions and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting phenomena." Research may be directed either toward testing a theory or discovering the nature of a phenomenon in order to form theory. In the absence of a well constructed theory of change and learning among architects, this study sought to discover the underlying variables and relationships of this phenomenon in order to develop theory for subsequent research.

While no substantive theory existed, the research did not begin in a vacuum. This chapter presents an overview of the literature that guided the study and continues to inform our understanding of change and learning in the professions. Background information concerning architectural education, the professions, and continuing professional education is also presented in order to establish a context for the literature.

Background

The Architectural Context

Very little is known about the continuing education of architects. The low state of knowledge is illustrated by a lack of a scholarly literature base. A scan of electronic databases of architectural and educational journals revealed fewer than a dozen articles concerning continuing education in architecture. This was in dramatic contrast to the thousands of articles and published studies in continuing medical education (Davis et al, 1995).

Of the architectural articles, most were descriptions of programs or policies rather than reports of research (Bernstein, 1988; Levy, 1991; Todd, 1987). Exceptions include a study of architects' information sources (Burnette, 1979), a study of organizational learning in architecture firms (De Monchaux, 1993), a study of self-directed learning readiness among architects (Spencer, 1996), a study of architects learning activities and resources (Price et al, 1991), a study of designer's information processing (Newland et al, 1987), and a study of marketing changes and learning among architects (Gruenwald, 1995).

Several factors or combinations of factors may account for this small number of academic contributions. First, a relatively small number of individuals

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are licensed architects. The U. S. Bureau of the Census (1995) estimated that 141,000 persons were employed as architects; although, the actual number of licensed architects may be less than 90,000 (Cuff, 1994) (Gutman, 1988). This compared to 628,000 physicians, 821,000 lawyers, 371,000 clergy, and 1,866,000 engineers (U. S. Bureau of the Census, 1995). Nonetheless, the number of journal articles in architecture was less than the ratio of architects to members of other professions would otherwise predict.

A second possible cause is the relatively low emphasis on formal education as a prerequisite for entry into practice. As of 1987 less than half of all states required an accredited degree in architecture to become licensed to practice. Individuals could become eligible to sit for registration exams in one of two ways. They could obtain a professional architecture degree and then work under the supervision of a licensed architect for two to three years; or, they could work with an architect for a longer period, six to eight years, and pass an educational equivalency exam.

It should be noted that a degree has been the preferred means of entry into the profession for many years, and that the leadership in the profession and principles of significant firms have generally been college educated (Cuff, 1991). It also should be noted that most professional architectural degrees are offered

at the bachelors level. Thus, similar to teachers and accountants, architects may complete their formal education within five years. Though architects have achieved a higher level of education relative to the general public, their education level is relatively lower than professionals in law, pharmacy, and medicine. Since, educational level is often cited as a factor contributing to participation in continuing education (Cross, 1981; Knox, 1977), this may be a factor affecting interest in continuing education in the architecture profession.

Third, attitudes toward formal education may be only slightly better among architects holding degrees than those who do not. Architects report that they most value and rely upon experiential learning; although, the knowledge they gain tends to be applied toward specific problems rather than contributing to learning at the level of wisdom (De Monchaux, 1993). This pattern of informal project specific learning is also fostered in the schools through the use of the "design studio" teaching method, which has dominated the curriculum of virtually every architectural degree program since the late nineteenth century (Cuff, 1991; Jones, 1989).

The scale of the organization of practice may also contribute to a greater reliance on tacit and informal learning. Only six percent of all architectural firms employ more than twenty people; although, they employ nearly half of all

architects (The American Institute of Architects, 1994). But even in larger firms, a studio-like atmosphere is often purposefully created by organizing the employees into small team settings. In these small settings architects learn informally with the focus of their learning on their current projects (De Monchaux, 1993).

The design studio concept is both a strength and a weakness for the profession. On the one hand, it is a powerful agent for socialization and learning practical skills. It encourages learning by doing, learning from peers, and faculty coaching (Schön, 1987). These attributes led Schön to recommend this method as a model for teaching in other professions. Mayhew et al (1974) also recommended architectural education as a model for higher education because of its potential for inter disciplinary cooperation and teamwork. Unfortunately, the design studios within the schools have historically emphasized aesthetic design to a much greater degree than all other aspects of professional practice. One critic of the profession suggested that this problem may be systematic, because disenchanted designers who are unable to impose their design aesthetic in practice often turn to teaching in an effort to influence future designers (Wolfe, 1981).

This zealous design orientation contributed to a mismatch between the

ethos of professional ideals and values learned in the schools and the circumstances of professional work. This in turn led to an exceptionally high degree of work dissatisfaction among architects (Cuff, 1991). Under these conditions it is no surprise that distrust of architectural faculty and formal education might exist among many practitioners.

Many architectural educators also recognize that a schism between education and practice does not serve the profession and are attempting to introduce more practice issues into their curriculums. In regards to continuing education, however, significant barriers still remain. A report prepared by a committee of architectural deans provides the following summary of factors limiting the role of schools in the continuing education of architects:

> "First, the schools are generally insulated from the architecture community at large. Second, with few exceptions schools lack the resources to stay at the cutting edge of building technology and computerization. Third, the schools' mission of initial preparation may be inherently at odds with the needs of mid-career practitioners. Fourth, schools lack certainty as to what constitutes the knowledge base of architecture. Finally, there are few career rewards for faculty who offer continuing education classes (Malecha, 1993, pp. 83-88)."

The attitudes of architects toward formal continuing education are apparent in the policies of the profession. Architecture, along with engineering, has until very recently resisted joining with all other major professions in

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implementing continuing education requirements for relicensing (Phillips, 1992).

While the merits of mandatory education are certainly debatable, without this

motivation, albeit artificial, the profession has not been able to develop an

infrastructure capable of supporting research, program development, and the

dissemination of knowledge. By comparison continuing medical education

requirements implemented in the mid 1970s appear to have resulted in an

extraordinary growth in both participation and research opportunities (Davis &

Fox, 1994; Little, 1993).

The Professional Context

A clear definition of professions is elusive. Becker examined the efforts

of social scientists since 1900 to define the term "professional" and concluded

that no one definition or set of occupations can be acceptable to all (Becker,

1962). A list of characteristics developed by Flexner (1930) is, however,

representative of most of these efforts:

1. Involves intellectual judgment by individual practitioners.

2. Learned activity with a constantly growing base of knowledge and responsibility for learning and research that continues beyond initial preparation.

3. Practical activity.

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4. Involves special techniques.

5. Organized for the purpose of controlling the quality of the profession.

During the 1930s when Flexner offered these criteria, distinctions between professions and vocations were no doubt easier to recognize. Only a few vocations, such as medicine, law, clergy, teaching, and, to some extent, architecture and engineering, were commonly thought of as professions. Today many vocations can claim they are professions within Flexner's definition. This is a result of the *zeitgeist* for professionalization during the late nineteenth and early twentieth century which encouraged all occupations to become professions (Bledstein, 1976). Houle offered an approach to categorizing professions involving thirteen dynamic processes rather than static characteristics. His scheme recognized that professions, even the established ones, are always in a state of professionalizing (Houle, 1980). Houle's method was not meant to draw a clear line between professions and non professions but did provide an index as to the degree of professionalization.

Despite the difficulty in defining the professions, there is no lack of critics who have suggestions for their improvement. Professions and aspiring professions have drawn critical review because of their special contract with

society. They pledge to provide needed services in a responsible manner in return for control over their areas of expertise. Concern over the special status and privileges given professionals has long existed, but in recent years this arrangement has been questioned. In the words of (Metzger, 1989, p. 581), "As a form of public entertainment, pestering professionals is hardly new. What is new about this current phase is its less genial mood, and its more jugular objective."

The attack on the professions peaked in the 1970s when books such as Illich's The Disabling Professions and Lieberman's Tyranny of the Expert were widely read. These writers and their cohorts described the professions as morally corrupt institutions which were beyond redemption. Metzger countered this claim by pointing out that much of the movement for reform and moral revitalization during this period came from within the professions. He further suggested that professionals generally reflect prevailing values more than they battle to overcome them, and added, "They may accelerate cultural trends in progress, but when they do, they are likely to use institutional channels that follow the lay of the land (Metzger, 1989, p.583)."

Other less critical concerns for the professions have also emerged during the last two decades. As early as 1980, Houle recognized that modern

professional practice was changing from one-on-one with clients to a more

collective work environment which would require greater skill in team work and

project management (Houle, 1980). Current trends in managed health care attest

to this shift in professional culture among physicians. While this may be a new

phenomena to some professions, it has been a common characteristic of

architectural practice for over a century. Architects typically work in teams or

direct teams comprised of a variety of consultants and other architects. This is

an area in which the study of architectural practice may contribute to other

professions.

Another expressed concern for the professions is their apparent lack of

interdisciplinary efforts and leadership directed toward solving societal problems

(Mayhew et al, 1974). Cervero too charged that professions could better serve

society by engaging in a constant critical review of their practices (Cervero,

1988). The call for professions to take on more leadership and to be more

reflective is indicative of an important characteristic of professions that is

missing from Flexner's definition. According to McGlothlin (1964), true

professions have a covenant with society in which they accept responsibility to

serve the best interests of society in return for special privileges and status.

Kimball (1992) traced the origin of this covenant to the first true

profession in America - the ministry. The word profession as we now use it evolved from the action of ministers *professing* their commitment to selfless service to the church. Kimball argued that the professions of law, the professorate, and medicine acquired some of the attributes and status of the ministry as they emerged in the later half of the 19th century. It is this calling to selfless service that separates professions from vocations.

Finally, true professions are self-referenced sub cultures. Members of each profession hold a unique set of common values and speak a special language not easily understood by outsiders (Cuff, 1991). As defined by Nowlen (1988), professional culture is the context within which individual meaning-making and personal growth take place. Nowlen described the factors affecting professional performance as a double helix of a professional's personal history intertwined with the professional culture. This concept is supported by emerging theories of organizational learning that suggest that members of an organization and the organization itself can learn and that this learning is affected by organizational structure and climate (Senge, 1990).

Nowlen's concept has special significance for continuing professional education and this study. It suggested that understanding change and learning in the professions must include the perspective of individual professionals; and,

the study of continuing professional education must recognize the unique cultural influences of each profession.

The Continuing Professional Education Context

Continuing professional education (CPE) is a relatively new field of study. The term itself has only come into common use since the 1960s. A major contribution to establishing CPE as a distinct area of study was Houle's (1980) scholarly overview of the policies and practices of seventeen professions in the United States. The central theme of his book was that the professions were in a state of crisis, and that a new paradigm of continuing professional education was necessary to resolve it.

Houle (1980) argued that the ad hoc mixture of association conventions and meetings, journals, sales representations, and occasional formal educational activities that constituted the state of continuing professional education should be replaced by a more systematic approach and a much greater commitment to lifelong learning among the professions (Houle, 1980). Although Houle was not clear on the course of action to achieve this new paradigm, he did provide a comprehensive description of the issues and thoughtful discourse on possible alternatives.

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The crisis that concerned Houle arose during the 1960s and 1970s as the mystique of the professions began to fade in the public's eye. The reasons given for this decline included real and imagined shortcomings in professional competence, concern over the ability of professions to regulate themselves, and the perception of some that professional elites were oppressing the powerless by controlling service markets. Also during this time, professionals themselves were becoming increasingly concerned over the competence of lesser able colleagues. Houle saw that continuing education would play an increasingly important role in addressing these issues. He cautioned, however, that merely increasing traditional continuing education activities, which typically involved simple lectures or classroom formats, were not likely to be effective or efficient in bringing about the needed level of reform.

Houle encouraged research into forms of learning, including self-directed learning, that would result in actual improvements in practice. Houle feared that political expediency combined with false assumptions about learning could result in ill conceived mandatory continuing education requirements for professionals. Unfortunately many of Houle's concerns were realized as increasing numbers of professional regulatory agencies implemented policies based on traditional educational practices. Driven by more recent research, a reexamination of past

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assumptions is underway in continuing medical education (Fox, 1995).

Among Houle's contributions to CPE is his own research into modes of learning among professionals. He identified three, the first of which he referred to as *inquiry*. This was defined as the process of creating a new synthesis, idea, technique, policy, or strategy of action. Sometimes this involved structured activities, such as seminars or discussion groups, but more often learning was a by-product of efforts directed toward creating a policy, working out compromises, or projecting plans. *Instruction* was Houle's second mode of learning, which he described as involving instructor led activities commonly associated with education. The third mode was referred to as *performance*, which was the process of internalization of skills and knowledge that took place with repetition in practice.

Houle's modes of learning are typical of the descriptive nature of his work. They contribute to our general understanding of the professions but do not address the how and why of professional learning nor the subtle relationships between learning and change in practice. Nonetheless, his work has been critical in establishing CPE as a distinct form of adult education and has provided subsequent scholars a framework for inquiry and a standard for scholarship.

Building on the foundations of Houle's work, Cervero (1988) offered another approach to understanding the nature of CPE. According to Cervero society and educators have viewed the professions from either a *functional* or *conflict* perspective. *Functionalists* see professionals as "possessing a high degree of specialized expertise to solve well defined problems" (p. 22). In this context continuing education is instrumental in helping professionals to improve their knowledge, competence, and performance, which is assumed to result in a higher quality service to clients. CPE thus becomes a primarily technical process performed in support of enhancing the "power and responsibility of the vocation" (Houle, 1980, pp. 30-31). According to Cervero, most continuing professional educators act within this frame of reference, and their efforts are generally directed toward incremental changes in practices.

Proponents of the *conflict* viewpoint, such as Illich (1977) and Larson (1977), contend that professions create a need for their services and strive to control the public's access to competing services. This view suggests that educational interventions must take place at the "social-structural level, not at the individual level" in order to weaken the professionals' power over the public (Cervero, 1988, p. 29). The role of continuing professional education in this paradigm is to advocate systemic change.

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Cervero offered an alternative to the purely *functionalist* or radical *conflict* viewpoints. He suggested a *critical* approach in which one concedes the need for the special knowledge and competence of professions while recognizing the lack of consensus about professional quality and standards. Cervero suggested that continuing professional education should both address the competency needs of the profession and encourage professionals to reflect upon the use of that knowledge. Critical educators should ask, "Why should professionals have this knowledge?", and "To what ends it will be put?" (Cervero, 1988, p. 36).

Consistent with Cervero's critical view, Schön (1987) observed that professionals often must make decisions concerning ambiguous situations that fall outside of the profession's knowledge base and the individual professional's zone of mastery. In such cases, human values and interests and personal experiences of professionals have a significant influence on practice decisions. Schön further suggested that professionals engage in a process of simultaneous reflection and action toward resolving these ambiguous situations. Educators should, therefore, work toward enhancing the professionals' reflective abilities.

Several other scholars have contributed to the general knowledge base of

CPE. Significant among them are the works of Knox and Nowlen. Knox has written on a variety of issues including reasons why professionals participate in continuing education (Knox, 1990). He offered a theory of motivation based upon professionals' concern for proficiency in practice (Knox, 1986; 1980). According to Knox, when professionals perceive a gap in their proficiency, they become motivated to learn in order to reduce their anxiety. This theory further suggested that if gaps in proficiency are perceived as very small or very large the professional will be less likely to engage in learning.

Nowlen too has contributed to the general knowledge of CPE. He brought attention to the importance of considering personal characteristics and professional culture in the planning of continuing professional education. He argued eloquently that these two factors intertwine like a double helix and in doing so affect both learning and performance (Nowlen, 1988).

The works of Houle, Cervero, Knox, Nowlen and others (Argyris & Schon, 1974; Baskett & Marsick, 1992; Bennett & Legrand, 1990; Davis & Fox, 1994; Fox, Mazmanian, & Putnam, 1989; Grotelueschen, 1985; Scanlan, 1985; Smutz & Queeny, 1990) constitute the foundation of the emerging field of continuing professional education. Each scholar presented a somewhat different vision of CPE, thus the picture is yet complete. But what is clearly

evident in their works is a shared belief that the overarching purpose of continuing professional education is change.

Theories of Change

Many sociologists and psychologists have endeavored to understand how change may be planned. Their theories and findings contributed to this study by providing insights into the general process of change among humans. Kurt Lewin's field theory is the most well known and influential of these theories (Bennis et al, 1985). It represents three important concepts in the study of change. First, change is a process with ordered stages. Second, motivations for change can be described in terms of external and internal forces. And, third, learning is both an outcome and a means of change.

Stages of Change

Lewin identified three stages of change, which he termed unfreezing, moving, and freezing (Lewin, 1951b). In stage one, people must *unfreeze* their value and cognitive structures. In stage two, they must *move* from their current

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level of learning to the desired level of learning. Lewin further suggested that learning must be considered within the context of groups to which individuals belong or desire to belong. Finally, they must *freeze* the new cognitive and value structures to give permanence to the new level.

While accepting Lewin's basic construct of change, Putnam & Campbell, (1989) suggested a somewhat broader view of learning in the change process. In analyzing changes made by physicians, they found that learning took place during both the unfreezing and freezing phases as well as the moving phase. They also found that physicians often made substantial changes in their lives and practices through self planned learning.

Forces for Change

As suggested by Putnam and Campbell, change can not be studied without considering the forces, or motivations, that drive and shape it. The concept of forces acting on individuals within their *life spaces* was central to Lewin's force field theory. According to Lewin (1951a) individuals live in a state of *dynamic equilibrium* in which needs, *driving forces*, are held in balance by counteracting internal psychological forces. A change in external forces leads to a corresponding change in internal forces. Additionally, people possess *valences*

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and *values* with respect to external forces, and they act within limits of possible behaviors referred to as *restraining forces*. Tension is created when the relevant valences and values change or the magnitude of one or more external forces becomes greater than the internal forces counteracting them. In Lewin's scheme people seek to reduce this tension by changing their relationship with the environment.

While Lewin's construct remains a powerful tool for understanding and describing human behavior, De Rivera (1976) suggestd that Lewin did not adequately account for intending, creative characteristics in human beings. This may in part be due to Lewin's use of *scientific* terms, such as *forces, fields*, and *valences*, and formulas, such as B=f(P*E), to describe and explain human behavior. This scientific approach over emphasizes, perhaps unintentionally, the role of external forces in directing human actions and, thus, suggests that people are simple organisms responding only to external stimuli. Subsequent theorists such as Vroom (1964) and Bandura (1986) developed models of motivation that ascribed greater influence to internal thought processes, personal choice, and goal setting.

According to Vroom (1964) motivation is "...a process governing choices made by persons or lower organisms among alternative forms of voluntary

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activity (p. 6)." In this construct motivation is dependent upon the interrelationships between preferences or *valences* for possible outcomes, preferences toward alternative means to the outcomes, and the degree of *expectancy* that the outcomes are achievable. Vroom further suggests that internal conflict resulting from external forces for change is not necessary in order to drive change toward an anticipated goal.

Bandura's Social Cognitive Theory spaned the motivation and behavioral theories of Vroom and Lewin by describing the human condition as a dynamic ongoing interaction between our internal processes of thinking and perception, our actions, and our external environment. According to Bandura (1986), these key elements have constant reciprocal influences upon one another. We construct knowledge from our attitudes, values, motives, and perceptions; and, in turn, our perceptions are governed by our knowledge, and so forth. Bandura's model is of particular value in the discussion of change and learning because it directly links learning processes to motivation and behavior. This link is illustrated in the following description of Bandura's five fundamental cognitive capabilities (Mann, 1990).

First, people have *symbolic* capabilities. We can store previously experienced examples of actions, which can be applied to similar future

situations as they arise. Schön (1987) described this process among architectural students as building a repertoire of professional procedures and concepts.

Second, people have *forethought* capabilities. We can plan for the future; and, we can bring our plans into the present. Thus, our images of the future influence our actions.

Third, people have *vicarious* cognitive capabilities. We can learn from observing others' behaviors and results of their behaviors. In addition to instrumental knowledge about these events, we develop related attitudes and expectations.

Fourth, people have *self-regulatory* capabilities. We can set standards for our behavior, set our own goals, and direct our actions toward those goals. Discrepancies between our behavior and the standards we have set for it will often motivate and direct our actions. This concept is at the heart of Knox's proficiency theory.

The fifth cognitive capability is the capacity for *self-reflection*. We can reflect and analyze our experiences and our thought processes. Through self reflection we develop a perception of our self efficacy, our capability to perform a specific task. Self efficacy then becomes a critical factor in making choices for

actions and goals.

The works of Bandura, Vroom, and Lewin provided several concepts relevant to the proposed study of change and learning among architects. Among these are that change is driven by internal and environmental forces; change is influenced by cognitive processes; and, cognitive processes are influenced by images of change. These concepts represent a view of motivation and behavior at the scale of individuals and their life spaces; however, change also takes place at the group and societal level. This perspective is presented in the literature of change strategies and diffusion of innovation.

Change Strategies

Chin and Benne (1985) suggested that all change strategies can be placed into one of three fundamental categories. The first group, *empirical-rational strategies*, assumes that humans act in their own self interest and will adopt change when presented with factual evidence supporting the desirability of the change. The development of our public educational system owes much to this perspective on change. The second group, *normative-re-educative strategies*, differs from the rational strategies in two important ways. First, humans are seen as "inherently active, in quest of impulse and need satisfaction (p. 31)." They

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do not wait for stimuli from the environment in order to respond. Further, human intelligence is assumed to be socially constructed. Thus, human behavior is shaped by the transactional relationships between individual personality and the social norms of culture. The third group, *power-coercive strategies*, assume that people can be made to change through use of political, economic, or moral authority, or through physical force. Change under these conditions may persist only as long as the power of enforcement is greater than the individual's power to resist it. Chin and Benne's study illustrated the importance of learning in planned change and indicated how it is interrelated with the nature of change.

Diffusion of Innovation

Diffusion of innovation studies look at the patterns, rates, and associated characteristics of adoption of new innovations into large groups. Rogers (1983) is most closely identified with this field of study, which is primarily grounded in communications theory. His studies suggested that people tend to adopt innovations at different rates depending upon their orientation and willingness to change. For any given innovation and group, Rogers found that people can be classified in the following ways: about 5-10 percent are the *innovators*; about 12-15 percent are early *adopters*; about 33 percent are *early majority*

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adopters; about 33 percent are *late majority adopters*; and about 15 percent are *laggards* (Rogers & Shoemaker, 1971).

These findings seemed to imply that these group predispositions toward change may be characteristics of individual personalities. Based on an analysis of changes among physicians, Putnam and Campbell (1989) suggested that personal orientations influenced the process and nature of changes made. However, they could not say whether these differences were functions of personality, situation, or unknown factors.

The issue of orientation toward change may be less important than the presence or absence of five factors Rogers has found to be associated with adoption of innovations. The following are Fox and Bennett's (in press) interpretation of Rogers' factors in terms of changes within the professions:

1. Complexity of the innovation.

2. Relative advantage over existing practices and procedures.

3. Opportunity to observe the innovation in use before adopting it in practice.

4. Compatibility with other similar products or procedures already in the professional's practice.

5. Opportunity to try the innovation before adopting it.

Fox and Bennett (1996) suggested that these factors constitute more than

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a means to guide to increasing the rate of diffusion of innovation in a group but also represented the attributes of images of change within the minds of individual professionals. This concept linked back to Bandura's social cognitive theory and provided a clearer picture of how cognitive processes and, in particular, imagining the change, influences choices of goals and actions.

Intentional Change and Learning

The literature presented thus far supports the proposition that individuals make intentional changes as a consequence of either external or internal forces or their interaction. The works of adult learning researcher and theorist Allen Tough (1982; 1974) added additional support and revealed the enormous degree to which people engage in intentional change. They further revealed the instrumental role learning plays toward achieving these changes. Learning in this case refers to behavior directed toward obtaining information and skills rather than internal psychological processes.

Although Tough's research was conducted with the general population, it contributed directly to the study of change and learning in the professions in several important ways. It provided a model for the study of change and learning from the perspective of the learners. It showed that in addition to

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intentionally deciding to make changes, people most often plan and direct their own learning activities. It clearly demonstrated that learning involves both formal and informal learning resources, with the latter being far more commonly used; and, in a majority of cases studied, the motivating force for learning was the desire to improve performance or solve immediate problems related to work. Finally, it suggested that professionals may be intensely involved in changing and learning, as the level of activity was found to increase with education and social classifications.

Studies of Change and Learning

The first and most significant study of change and learning among professionals was the Physicians' Change Study conducted by Fox, Mazmanian, and Putnam (1989). In 1987 a group of continuing medical educators conducted interviews with approximately 375 physicians in the United States and Canada. The doctors were asked to identify recent changes in their practice or life and to recall associated learning activities if any had occurred. They found that most changes involve some degree of new learning, which varies according to the types of changes and the motivations driving them. The following diagram illustrates the nature of the relationships between learning, motivation, and

change:

Figure 1: Relationships between learning, forces for change, and changes.

The researchers found five distinct forces for change along a continuum from purely external to purely internal forces. They categorized these as social/regulatory, social/professional, professional, professional/personal, and
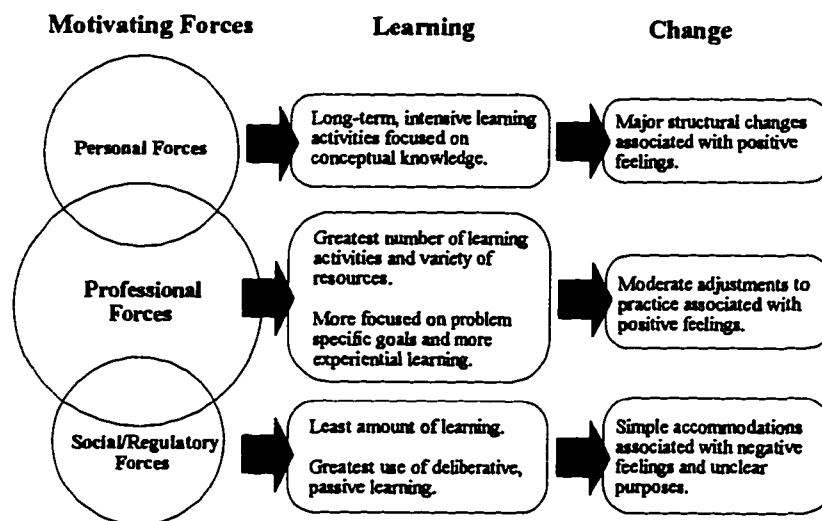
personal. According to Fox et al, these forces influence both the nature of a

change outcome and the related learning activities. For example, professional forces, which accounted for the greatest number of changes reported, were associated primarily with incremental changes related to issues of professional competence and the need to solve immediate problems. Social/regulatory forces on the other hand were most often associated with very small changes in practice, which the researchers referred to as accommodations. Social forces, such as pressure to conform to administrative procedures or new regulations affecting practice but not perceived as improving practice tended to involve the least amount of new learning and was most often passive and deliberative in nature. The most dramatic changes, which were referred to as structural and transformational changes, were related to strong personal motivations that transcended both the social and professional forces, although professional forces were sometimes involved. Learning in these cases tended to be complex, conceptual, and long term. Similar to Tough's findings, participation in formal activities made up only a fraction of the learning resources identified in the physicians' study.

Based on the findings of the Physicians' Change Study (Fox et al, 1989) and subsequent studies (Fox and Costie, 1996), Fox developed a model of change and learning among physicians (Fox and Bennett, in press). According

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to the model, physicians are constantly scanning their professional environment for information concerning their practice and the profession as well as reflecting upon their own internal needs and aspirations. Something in this milieu leads them to consider a change and to develop an image of that change. The physicians then engaged in a self assessment of their present state or efficacy as compared to that necessary to the change. Whether they will continue in the process to change and the nature of the path they take toward change will be influenced by the clarity of their image of the change and the quality of their self assessment.

Physicians who decide to continue in a change process will most likely engage in learning to assist in achieving their goals. Fox described this phase as the physicians' natural, self-directed curriculum, which is designed and carried out, albeit tacitly, by the physicians themselves. From available and known learning resources, they select resources and activities they perceive to be instrumental to their specific objectives. Fox suggested that these objectives can be categorized into three general purposes of learning. Physicians may first attempt to increase awareness and basic understanding in order to assess their need for the change or additional knowledge. They may next seek to gain competence in the area of desired change. Lastly, they may require additional

learning to apply their knowledge in practice. At any stage in this curriculum the physicians may decide to stop the learning project and return to practice with or without making a change. And, at each stage and in any combination, they may seek out instrumental learning resources in the form of human resources, such as colleagues; material resources, such as journals; or, less often, formal continuing education programs.

Studies providing support for the basic assertions of this model included a recent study of the adoption of innovations among radiologists (Fox and Costie, 1996), a study of triggering events in change and learning among gerontologists (Harvey & Fox, 1994), a comparison of learning patterns among two groups of teachers (Blanchard, 1992), and a partially completed study of change and learning among architects (Price et al, 1993).

Change and Learning in Architecture

In 1992, the Research Center for Continuing Professional Education at the University of Oklahoma conducted a national study of change and learning among architects. I served as principal investigator for the study, which was supported by The American Institute of Architects (Gruenwald, 1995; Price et al, 1993). The purpose of the study was to extend hypotheses developed from the physicians' change study to the profession of architecture; but, due to methodological problems, only a partial analysis of the data could be completed.

The study used a similar approach and methodology to that of the physician study. Data was collected from interviews conducted throughout the United States by volunteers using prompt sheets and standard protocols. Unlike the physician study very few of the interviewers had previous research experience; therefore, audio tapes of interviews were made by the volunteers and sent to the Research Center for analysis. Responses from the tapes were coded into categories established in the physician study. Eighty-one interviews of randomly selected architects were conducted and analyzed in this fashion.

Although there appeared to be general agreement with basic propositions from the physician study, deeper analysis of the data was problematic. Certain

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aspects of the culture of architecture gave rise to data for which no categories existed, while properties of some matching categories did not agree. I concluded that further analysis of the data using codes and categories from the physician study would not be productive. A theory of change and learning meaningful for the architecture profession would require a review of the interviews without regard to preconceived categories or propositions. However, my low confidence in the quality of the interviews and the rigid format in which they were conducted led me to conclude that a new study should be conducted.

Nonetheless a great deal of information of practical value was contained in the database of the study. Using this database Gruenwald (1995) conducted a secondary analysis for the purpose of developing a theory of change and learning limited to marketing practices of the architects interviewed. He concluded that in regard to marketing there was general agreement between his findings and those of the Physicians' Change Study.

Among his findings were the following. Architects most often initiated change in marketing practices and that these changes were most often related to professional forces similar to those identified in the physicians' study. Variations in change were influenced by the forces for change and the state of prior knowledge of marketing. Learning was most often involved in making the

changes and tended to be more deliberative for small changes and more experiential and conceptual for larger ones. And, learning in general was more likely to be directed toward solving concrete problems.

Gruenwald's study served as a valuable resource, but it did not provide a substantive theory of change and learning for practicing architects. First, analysis of the data was limited by the data collection format, which did not allow categories to emerge from the data. Second, the narrow focus of marketing practices did not inform the process of change and learning relevant to the central core of architectural practice.

Marketing of services is important to the survival of architectural firms, but it is peripheral to the duties and practices of an overwhelming majority of architects. Marketing is not a defining characteristic of the profession. Architects, even those involved in marketing, see themselves as people who prepare designs for buildings or assist in the production of documents necessary to execute those designs. This is central to the culture of architects and is reflected in their education, their certifying examinations, their journals, their professional associations, their professional rituals, and their practices. This study directly addressed change and learning within this context.

Summary

The field of change and learning is an emerging area of study. Little literature and few studies exist directly addressing the topic; although, the works of scholars from a variety of disciplines guide our research. Among these, Lewin has given us the basic concept of change as a process in which the tension between internal and external forces drive us away and toward change in order to maintain an internal dynamic equilibrium.

Vroom elaborated upon Lewin's concepts to include internal forces acting alone to motivate change without the need of conflict. He gave us an understanding of the role that personal choice based upon assessment of alternate goals and pathways toward goals affects the change process.

Bandura's Social Cognitive Theory provided a clearly constructed model of the dynamic reciprocal relationships between cognitive processes, actions, and change. His theory also informed our understanding of the importance of images of change in the change process.

Benne and Chin's models for planned change illuminated the importance of learning in these efforts and helped us understand the dynamics of social, coercive, and personal forces for change. Rogers too emphasized the importance of learning in diffusing change into groups and identified factors that

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affect the rate of adoption of change. Fox suggested that Rogers' factors for change are also attributes of the image of change that affect decisions about change goals and the means of achieving them.

Tough's research revealed to us that intentional change and self directed, non formal learning are common phenomena among adults. Tough found also that intentional learning is most often directed toward solving work related problems. Knox added to this knowledge by describing a model in which concern for proficiency explains professionals' motivation to participate in learning.

Finally, Fox et al conducted studies of change and learning among physicians' that brought together these disparate theories and provided a theoretical framework for the study of change and learning in other professions.

The literature presented in this chapter was useful in guiding this study; yet, none offered theory explaining change and learning in the profession of architecture. Fox presented the most comprehensive theory of change and learning, but it emerged from one professional culture - medicine. Gruenwald's study of change and learning attempted to build a bridge between architecture and medicine, but it was based upon incomplete data and was limited to a peripheral aspect of architectural practice. It was for these reasons that this

study was undertaken for the purpose of developing rich and appropriate hypotheses of change and learning among architects.

CHAPTER III

STUDY DESIGN AND METHOD

Overview

This chapter presents the conceptual framework and systematic approach by which an answer to the primary question, "Why and how do architects change their practices and what role does learning play in these changes?,"was sought. The Physicians' Change Study of Fox, Mazmanian, and Putnam (1989) served as the model for the design of this proposed study; although, certain modifications in methods were made. Also contributing to the framework of this study were the concepts of naturalistic inquiry, as defined by Guba and Lincoln (1985); grounded theory, as defined by Glaser and Strauss (1967); and qualitative methodology, as offered by Strauss and Corbin (1990).

An overarching assumption guiding the research design was that questions concerning complex patterns of human behavior are best approached from a naturalistic perspective. Guba (1981, p.77) described the assumptions of this paradigm as follows: there are multiple realities; inquiry diverges rather than converges as more and more is known; and all "parts" of reality are interrelated so that the study of any part necessarily influences all other parts. Naturalistic

inquiry is characterized by a heavy reliance on the human as the instrument for gathering data, a serious effort to develop an initial design statement even though it may be altered by the data, and a familiarity with the field conditions prior to beginning data collection (Guba & Lincoln, 1985, p.251) .

The study of change and learning among physicians conducted by Fox et al (1989) fit well into Guba and Lincoln's naturalistic paradigm. When initially faced with the question, "Does CME (continuing medical education) lead to change?," they recognized that traditional rational deductive studies of continuing medical education did not account for many variables affecting change and that many of the variables would in any case be difficult to control (p.2). They responded by first developing a descriptive natural history of their subject and then developing a taxonomy of their observations (p.7). This was chiefly accomplished using a constant comparative methodology directed toward the goal of discovering a theoretical model to explain change and learning.

Glaser and Strauss (1967) termed theory discovered through constant comparison of systematically collected data as "grounded theory"; that is, theory grounded in the data from which it came. Grounded theory is said to be much more suited to its substantive uses than theory generated by logical deduction from *a priori* assumptions. Glaser and Strauss observed, as did Fox et. al., that

much of social behavior research has over emphasized verification of theory while de-emphasizing the prior step of discovering concepts and hypotheses that are relevant for the area to be researched.

The development of grounded theory was a non linear process in which theory emerged during the collection and categorization of data and was continuously tested with the developing categories (Glaser & Strauss, 1967). Data was less valued as a reflection of fact than as a source for generating categories and illustrating emerging theories. Ideally, categorization of data, and generation of hypotheses should take place as the data is collected; and, the type and source of data collected should be adjusted as new areas of interest or categories are exposed during the collection process. However, this methodology can be difficult to follow due to limited time and resources.

Discovering theory was appropriate to the study of architects for two reasons. First, no comprehensive or substantive theory existed to explain the phenomenon of learning and change among architects; and, second, the naturalistic paradigm held that theory can not be abstracted from the context to which it is applied.

Study Design

This study primarily used a qualitative approach similar to that used by

Fox et al (1989) in their study of physicians. Data was collected from interviews

of architects and then processed into categories and analyzed through a method

of constant comparison as suggested by Strauss and Corbin (1990). Descriptive

statistics in the form of frequencies and percentages were derived from the

categorical data to support the analysis.

Subjects

According to Strauss and Corbin (1990), qualitative research should begin

with an open sampling of subjects representing the widest range of diversity.

The purpose of this diversity is not to generalize the findings of the study of

subjects, but rather to identify all possible concepts of theoretical importance to

the study. They further recommend that as categories of concepts and

hypotheses of relationships begin to emerge during a study, specific groups of

subjects should be targeted in order to maximize the opportunities to verify

dimensional variations of the categories and relationships (Strauss & Corbin,

1990, p. 186-187). This study proceeded directly to this second phase of

sampling for the following reasons.

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First, subjects within certain demographic categories were known to exhibit differences in learning patterns. A survey of learning activities among members of the American Institute of Architects (Bilello & Woodward, 1992) had found that architects in small firms had fewer resources to use in learning and that early career architects were more motivated to learn and engaged in a broader range of learning activities. Based on this knowledge efforts were made to interview both early and mid to late career architects within both small and large firms.

Second, in the researcher's initial attempt to study change and learning among architects (Price & Knowles, 1995) a *theoretical sensitivity* to the data was developed. According to Strauss and Corbin, "Theoretical sensitivity refers to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn't (1990, p. 42)." Thus, by focusing on groups most likely to provide a rich source of data the intent of Strauss and Corbin's approach was maintained, while allowing the study to be successfully completed within the limits of time and resources available.

An additional selective criteria for all subjects was that they must be currently practicing architects whose primary duties were directly related to the

design of buildings or the production of documents to carry out the design. This was done to insure that the core areas of practice were addressed. Potential subjects were identified by the researcher through personal contacts established through his years of practice as an architect and as a member of the Oklahoma Chapter of the American Institute of Architects. Due to time and cost constraints, only architects working within 150 miles of the University of Oklahoma were asked to participate.

The study initially set out to interview a minimum of twenty architects. This number was based on the assumption that five architects from each of the four targeted groups would be required to provide a reasonable data set. The four groups were as follows: early career architects in large firms, early career architects in small firms, mid to late career architects in large firms, and mid to late career architects in small firms. As the data was collected differences among the early career and mid career architects appeared to be of less importance than the size of firms and the specific job related roles of the architects. In all, twenty-seven architects were interviewed before a point of saturation of concepts was reached.

Data Collection

Data was collected in a manner consistent with Strauss and Corbin's suggested methods of qualitative research (1990). Techniques used by Fox et al in the Physicians' Change Study were incorporated into the study, specifically with respect to interview protocols.

Data collection differed from the physician study in sampling technique and in the implementation of the interview process. Subjects in the physician study were randomly selected, and all interviews were conducted simultaneously by volunteer interviewers. This study used targeted sampling of subjects and sequential interviews conducted by the researcher in order to more fully and expediently explore concepts as they emerged during the study. Preconceived coding categories from the Physicians' Change Study were ignored in favor of discovering concepts and categories more appropriate to the architectural milieu. This was in contrast to previous studies of change and learning among architects, physicians, and teachers (Gruenwald, 1995; Price et al, 1993; Harvey & Fox, 1994; Blanchard, 1992).

Other approaches to data collection were considered for this study, including ethnographic observation, use of "instruments", and the review of relevant documents (Guba & Lincoln, 1985); however, each of these methods

presented difficult practical problems. Ethnographic observations or the review of relevant documents would have required a great deal of time and would have limited the number of cases that could be studied by the researcher. An empirical "instrument" to measure relationships of change and learning among professionals would have offered an efficient, if not content rich, means of study, but none was identified in the literature.

The primary source of data was notes taken during interviews of the architect subjects. Information in the notes included relevant demographic characteristics, the subject's responses to open ended questions, observations of the subject's environment, observations of non-verbal gestures, and observations of physical evidence of change when available. All interviews were conducted in the subjects' places of work; and, with the permission of the subjects, audio recordings of interviews were made to assist in verifying the accuracy of the notes.

Potential subjects were contacted by phone. The nature of the study was explained to them, and if they agreed to participate an interview appointment was arranged. Subjects had to agree to dedicate at least forty-five minutes of uninterrupted time for the interview. Before the interview began the subjects were asked to review and sign a standard human subjects consent form. The

identity of the persons interviewed is known only to the interviewer, and no true names were used in reporting the findings of the study.

The interviews were initially guided by a set of open ended questions and prompt sheets (refer to appendix). The purpose of the prompt sheets were to assist subjects in recalling changes and possible learning activities. Changes to these protocols occurred as new questions and issues emerged during the study. The interviews attempted to elicit information in the following areas:

1. Description of a change in the architect's life or practice which has taken place within the previous twelve months.

2. Reasons for the change.

3. Information or development of skills sought to facilitate the change.

4. The role, if any, of formal learning associated with the change.

5. Amount of time spent in formal learning associated with the change.

6. Amount of money spent or lost opportunity related to learning and the change.

7. The architect's opinion as to whether other resources could have assisted in the change.

Before conducting analysis of data collected from the interviews, each interview was required to meet the following criteria:

1. The human subjects consent form was signed in advance of the interview.

2. The subject clearly identified at least one case of change in practice

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that took place within the last year and was able to describe significant events and actions relevant to that change.

3. The descriptions of change had to be internally consistent.

Data Analysis

As in data collection, the approach to data analysis closely followed the procedures for qualitative research recommended by Strauss and Corbin (1990). In this approach, data analysis and data collection were concurrent and interrelated processes, with both dependent upon the systematic coding of data through constant comparison of emerging concepts and relationships. Analysis took place in the context of the following three phases of coding: open coding, axial coding, and selective coding.

To facilitate the analysis, all notes taken during interviews were loaded into a text management software program called Atlas-ti. This software contained features designed to facilitate grounded theory research. These included automated retrieval of quotations linked to specific codes, the ability to write memos and link them to codes, and the ability to develop graphical networks showing the relationships of codes and categories.

Open coding was a process of breaking down, examining, comparing,

conceptualizing, and categorizing the data (Strauss & Corbin, 1990, p. 61). Beginning with the first set of notes, concepts related to significant incidents from the interview were identified. This was done without concern for the context of the incidents so as many concepts as possible could be generated. About 160 concepts were recorded in the Atlas-ti software during the initial coding phase.

After a number of concepts and their related properties were identified, those that appeared to pertain to the same phenomena were grouped together into *categories*. Memos were written describing the concepts and incidents associated with them. Incidents which were particularly descriptive of a category were saved as quotations in the Atlas-ti software so they could be used to illustrate the findings of the study.

Categories were generated throughout the study, but fewer new ones were found as the number of interviews increased. To economize the researcher's time, coding was stopped when a point of category saturation was reached. This occurred when new incidents ceased to be added to the definition of a category. Approximately 250 codes and categories were generated by the end of the study.

In the *axial coding* phase, the data was put back together by making connections between categories (p. 96). During this phase attention was given

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to the context, causal conditions, action strategies of the subjects, and consequences of actions related to the phenomena represented by each category. The researcher alternated between deductive and inductive reasoning to develop working hypotheses about the phenomena and then sought out additional supporting or discounting data. Memos were written concerning these relationships between categories and their theoretical implications to the study.

The final phase of coding was *selective coding*, which was a process of selecting the core category of the study and systematically relating it to the other categories (p. 116). The central phenomenon of this study around which all the other categories were integrated was *change*.

Following suggestions by Straus and Corbin, a paradigm for the central phenomena of change was constructed. This included identifying *causal conditions* that led to change, the *dimensions* of change, the *strategies* for change, and the *intervening conditions* affecting both change and strategies. The strategies of greatest interest to this study were those that involved learning.

This phase brought to a close the process of integration begun in the axial phase and resulted in the development of hypotheses and propositions to explain the architects' change events as described in the interviews. These theory-like statements have been presented in the context of an *analytical story*, which is

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"a descriptive narrative about the central phenomenon of the study" (p. 116). This story has been supported by the organized and categorized data and includes diagrams and descriptive statistics. Quotations and observations of incidents recorded in the notes and memos written during the study serve as a rich text for this story and contribute to the validity of the theoretical propositions.

An additional level of analysis was conducted involving the comparison of the propositions and theoretical model of change and learning among architects with those developed in the Physicians' Study. The purpose of the comparison was to identify similarities and differences in order to enrich our general understanding of the phenomenon of change and learning among professionals and to guide future research.

Limitations

The purpose and design of this study was to develop well constructed hypotheses that will serve future inquiry and add to the body of knowledge about change and learning in the architecture profession. Propositions and hypotheses from the study should not be generalized beyond the subjects of the study. These hypotheses are grounded in the data from whence they came; therefore, inferences to groups outside of the study are not appropriate.

CHAPTER IV

FINDINGS AND ANALYSIS

The purpose of this study was to identify patterns of change and learning in the practices of architects and to develop theories and propositions concerning those patterns. In order to accomplish that goal interviews were conducted with a selected group of practicing architects. Questions asked during the interviews sought to disclose the nature of recent changes in practices, the reasons for the changes, and the means of making the changes. The results of an analysis of the answers given to these questions constitute the findings of the study.

This chapter presents these findings in the following five sections: Section One describes the characteristics of the architects interviewed; Section Two presents the cases of change described by them; Section Three presents the forces driving the changes; Section Four presents the learning strategies used in making the changes; and, Section Five presents the intervening conditions affecting the changes and learning strategies.

Section One: Overview of the Data

The data consisted of notes taken by the researcher during face-to-face interviews with twenty-seven architects. Each interview lasted approximately one hour and was conducted in the architects' offices, which were located either in the Oklahoma City or Tulsa metropolitan areas. In addition to quotations and summaries of answers to the researcher's questions, each set of notes included basic demographic data about the subject of the interview and observations of the subject's work environment.

Subject Demographics

Gender and Age: Twenty-two subjects were male and five were female. Their ages ranged from 30 to 50 years, with the largest number of subjects, ten, falling in the 30 to 35 age bracket.

Education: All held either a professional bachelor or professional master degree in architecture. All but two of the subjects had received their architectural degree from one of Oklahoma's two accredited schools of architecture. Additional educational experiences included one subject with a master degree in construction science, one with a master degree in management,

and one with a degree in law.

Architectural Experience: The range of architectural experience, including work prior to receiving a license to practice, was from 4 to 29 years, with eight of the architects having fewer than 8 years of experience. Subjects devoted a minimum of 50% of their work effort toward the design and/or management of building projects. Five subjects focused on very specific aspects of project delivery while the others engaged in a broad range of tasks. Job titles provided by the subjects included eight project managers, seven designers, seven project architects, and two directors of architecture. Seven subjects were also principal partners of their firms and two were senior associates.

Work Environments: The subjects practiced in a wide range of work environments. The size of the firms, as measured by the number of persons employed in them, varied from one to six-hundred. Ten of the subjects practiced in small firms of ten or less, ten in medium firms of 11 to 25, and seven in large firms of 110 or more. The atmosphere of most firms appeared relaxed with open communications among employees. This was especially true in the small and medium sized firms. There was also evidence that most of the firms were quite busy and that the subjects regarded their work seriously.

The larger firms tended to be more corporate in both image and

management style. These firms attempted to moderate this tendency by organizing staff into teams. In most firms, large and small, the physical layout of their offices and the use of open work stations facilitated communication among coworkers. Most architects worked in close proximity to coworkers at or near their position in the firm. Principals and management level architects tended to isolate themselves in traditional enclosed offices.

Section Two: Cases of Change

The twenty-seven architects interviewed recalled a total of 130 incidents of change. Changes that related to core practice issues, appeared to be well defined, and/or had the potential for exposing new concepts were further discussed with the subjects. This yielded a total of eighty-one change stories. The completeness and clarity of these stories varied greatly. Often the architects had difficulty ascribing an ending or beginning point to their changes. They perceived many of their changes as *ongoing* or as part of an *interconnected* web of changes. Although these cases were difficult to categorize, they provided insight into architect's perceptions and approaches to change.

Areas of Change

The 130 incidents of reported changes were categorized according to the specific skills, knowledge, or attitudes that were addressed. Enough similarity was found among the 130 incidents to form 45 categories of specific areas of change. These were then assigned to one or more of twelve general areas of change. Table 1 lists these areas of change and indicates the frequency of incidents associated with each specific and general category.

Table 1: Frequencies of Specific and General Areas of Change

Area of Change Cases		Area of Change Cases		Area of Change Cases	
Computers	**(39)**	**Design**	**(21)**	**Quality Assurance**	**(19)**
e-mail	9	New Building Type	9	Proj. tracking methods	5
Internet	6	Programming	4	Increased Emphasis	5
CAD	5	Team approach	3	Scheduling software	4
Project Mgt	4	Philosophy	1	Drawing standards	2
3-D modeling	3	Doing more	1	New office procedures	2
Presentations	3	Using charette method	1	New role on des. team	1
Gen software	3	Lighting	1		
PIM software	2	Landscape	1		
Networks	2	Industrial	1		
Specifications	2				
Project Mngmt.	**(15)**	**New Role**	**(12)**	**Codes**	**(10)**
Proj. tracking methods	5	New Firm	3	Code Review Method	5
Scheduling software	4	Management	2	Keeping up (BOCA)	4
Proj. tracking software	3	Increased responsibility	2	New local ordinance	1
Writing skills 1		Designer 2			
Managing large projects	1	Working w/ clients	1		
Cost estimates	1	Computer expert	1		
Presentations	**(8)**	**Specifications**	**(6)**	**Marketing**	**(4)**
PowerPoint/video	3	Increased emphasis	4	General	3
Use of 3D modeling	3	Special software	2	Using the Internet	1
Drawing w/ computer	2				
Office Management	**(4)**	**Building Tech.**	**(3)**	**Other**	**(2)**
Phone /Time sheets	2	Metal buildings	1	Teaching	1
Gen Management	1	Flashing details	1	Political campaign	1
Filing System	1	Steel construction	1		

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The variety of categories presented in Table 1 indicate a balance of changes in various aspects of practice. Computers and related information technologies accounted for 30% of changes. The overlapping areas of quality assurance and project management accounted for 20% of change; while changes in design, office roles, and codes accounted for 15%, 8%, and 7% of changes, respectfully.

Dimensions and Properties of Change

In addition to areas of practice, changes also exhibited several dimensional properties. These included *direction, scope, complexity,* and *scale* of change.

Direction: The direction of change was not always toward a new situation or behavior. A few exceptions were found in which architects had changed back to a previous condition. One architect had joined a new firm and found that drafting by hand rather than on computer was more appropriate for the type of work done there. In another case, the architect had reverted back to a specific type of team design that he had used years before. Among the cases reported, *reverse changes* required little or no new learning.

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Of more significance to understanding the nature of changes, are the dimensions of *scope* and *complexity*. *Scope* refers to the breadth of the area of change. For example, two architects described changes in using computers for presentations. One was focused on using a specific presentation software while the other described the integration of several programs and technologies including 3-D graphics. Sometimes the scope of an initial change reached into several other areas of practice. The following story of an architect who had taken on a new role as contract administrator illustrates this point:

> *I am involved in negotiating a contract for a major project with the city. This is a new role for me. I've had to read the contract requirements - this is part of a very large and complex urban redevelopment project - and discern what hours would be required to fulfill each task. I had to learn to use a spreadsheet program in order to track the costs and fees from our consultants. I have also had to learn about liability issues and potential pitfalls of this type and scale of work.*

New roles were associated with the greatest variety of discreet changes. In most other change categories the scope was narrower and more consistent between change stories.

Complexity refers to the number of conditions that have to be met in order to make a change and the individual professional's assessment of their ability to meet those conditions. This dimension relies heavily on the perceptions of the

architects and is relative to each architects situation. Some architects considered changing to a new CAD (computer aided drawing) system as relatively simple while others did not. In general most architects did not consider their changes to be overly complex.

Another dimension of the changes was the impact they had on the individual subjects. The term *scale* was used to describe the relative size of change as perceived by the individuals involved. Of the eighty-one cases of change, 17% (n= 13) were considered to be small scale changes, 64% (n=54) moderate scale changes, and 16% (n=14) major scale changes.

The architects also expressed *feelings* toward their changes. Positive feelings were associated with 66% (n=54) of the eighty-one changes studied, while neutral and negative feelings accounted for 26% (n=21) and 7% (n=6) of changes, respectfully.

Types of Change

The concept of types of change expresses the amalgamation of the properties and dimensions related to the changes. It takes into consideration the scale, complexity, scope, and feelings associated with the changes. This concept was first introduced in the Physician Study in which the following four types of

changes were identified: *accommodations, adjustments, redirections,* and *transformations.* This study also found evidence of the type of changes described in the physician study and used the same terminology to identify these properties of change.

Accommodations accounted for 12% (n=10) of the changes. These were usually small to moderate changes associated with negative and neutral feelings, and were the least likely to involve new learning in the change process. The following is an example of an accommodation change:

> *This particular change was dictated by one of our major clients who uses Auto Cad rather than the system we were using. Even though we could translate files from one program to another they felt more comfortable in exchanging files directly from the same software. I don't think AutoCad is as efficient as the system we use but eventually I will master it and be ok. I haven't learned to use the system yet, but I want to so I will be better able to manage the office. On small projects I will continue to use the system I am most familiar with.*

Adjustments accounted for 57% (n=46) of changes. These represented primarily incremental changes to practices and were associated with positive or neutral feelings. New learning was involved in 85% (n=65) of these cases.

Redirections accounted for 26% (n=22) of the eighty-one changes. These changes were structural changes involving significant new roles or responsibilities. They were most often associated with positive feelings and

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long-term learning activities.

Transformations accounted for only 4% (n=3) of the changes. These changes were similar to redirections but were more profound in their impact on the individuals involved. One case of a transformation was reported by an architect who's concern for urban planning and development had led him to run for political office.

Table Two presents an overview of the change types and their relationships to the properties of *scale* and *feelings*.

Table 2: Frequency of Changes by Type, Feeling, Scale, and Learning.

	Cases		Feelings			Scale of Change		
Types of Change	All Cases	w/Learning	Positive	Neutral	Negative	Small	Moderate	Major
Accommodations	10	6	1	5	4	5	5	0
Adjustments	46	36	31	15	0	8	37	1
Redirections	22	18	19	1	2	0	12	10
Transformations	3	3	3	0	0	0	0	3
Totals	81	65	54	21	6	13	54	14

Section Three: Forces for Change

Change in the life and practice of a professional rarely just happens. There are forces that initiate change and forces that drive change. These forces originate both from within and without the professional's being. The study of physicians by Fox et al (1989) discovered three primary groups of forces responsible for change. Those involving relationships with social groups and institutions were referred to as *social/regulatory forces*. More intrinsic forces were referred to as *personal forces*. The third set of forces originated from within the profession and were called *professional forces*. The physician study proposed that *professional forces* lay at the mid point on a continuum between external and internal forces.

With regards to forces for change among architects, this study found two notable exceptions to the construct of forces put forth by Fox et al. Through the process of coding and constant comparison of concepts from the data, categories of forces were developed unique to the architects in the study. Personal and professional forces emerged in similar form to those from the physician study; however, other forces did not fit comfortably in the social/regulatory category. The architects' relationships with their firms gave rise to a distinct group of

forces, which were labeled *firm forces*. These forces served a pivotal role, similar to that of the *professional forces*, in which they mediated between personal and external forces. The social/regulatory category did not adequately express this relationship; thus, the firm category was created.

The social/regulatory category also did not adequately convey the architects feelings about regulations, specifically those pertaining to *building codes*. While only one architect expressed any pleasure in dealing with building codes, all accepted them as being a part of practice rather than an imposition on practice. Several architects referenced their ability to interpret the codes as an indicator of their professional expertise. Therefore these regulatory forces were considered to be within the realm of the professional forces.

The study did reveal other forces possessing the properties of the social/regulatory category as described by Fox et al (1989). These forces originated primarily from outside of the architects' personal and professional realms and included social, technological, and economic forces. Because of the extrinsic nature of these forces, they were categorized simply as *external forces*. Figure 2 illustrates the relationships between the four primary forces for change discovered in the study.
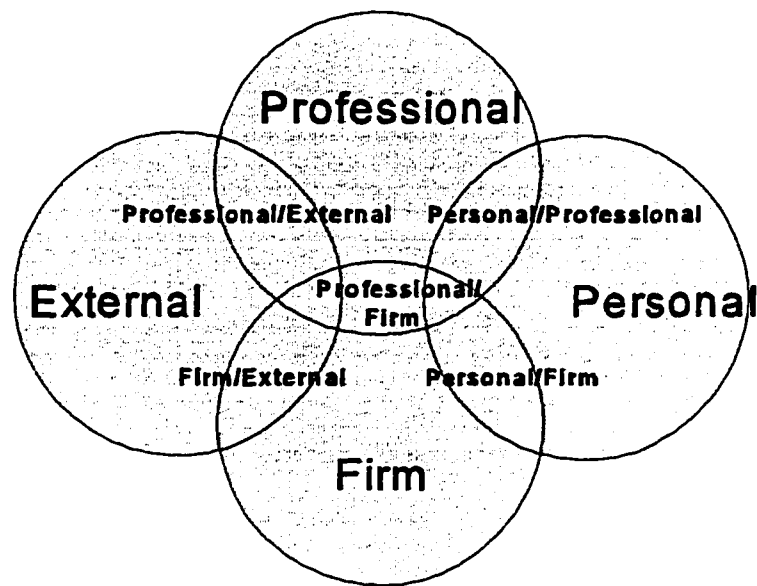
Figure 2: Interaction of Forces for Change

Professional Forces

Many of the change cases revealed that the architects were often motivated to change by their concern for their ability to fulfill their professional responsibilities and/or to maintain their professional identity. These *professional forces* directly accounted for 10% (n=8) of changes and acted in concert with other forces in thirty-eight additional cases. The full power of belonging to the profession exerted itself when changes were not personally desirable to the architects. This was often the case in tasks that involved reviewing building

codes or writing building specifications. Architects willingly made these changes if they perceived that the change served a professional purpose. The following story from the data illustrates this concept.

> *I am involved in the design of a building for the Air Force. They have very complex code requirements that are made up of parts of several national codes as well as their own additions. It requires very careful review. It's a real maze. We have a guy in the office that usually helps us on codes - but I am going to try to do this myself. I don't really like doing this but I feel I should understand codes. I have purposely minimized my questions to staff in order to force myself to go through all the materials.*

When this architect stated, "I feel I should understand the codes," he clearly meant that he as a professional architect should understand the codes. Another example from the data is the following:

> *I am now using the Master Specs specification system. I am especially trying to use the research data contained in it. I want to be more mindful of what materials and products we are specifying. For example, environmental hazards associated with materials and also the proper use of materials.*

In this case neither the architect's clients nor regulatory agencies were demanding that she have expertise in environmental hazards. Her desire to learn in this area was driven primarily by her sense of responsibility as an architect to watch out for the welfare of her clients and the public.

Firm Forces

Architects have special relationships with their firms that give rise to forces that initiate and sustain changes in practices. *Firm forces* emerged as a distinct cause of change in 12% (n=10) of the eighty-one cases studied. It was also associated with thirty-three additional cases involving the other primary forces. The scale of change resulting from these forces varied from simple practical changes to much more involved complex changes. The following examples represented small changes associated with firm forces:

> *In this firm e-mail is used extensively. I had to learn the system because it was required of everyone in the firm.*
>
> *We have many new procedures in place recently. Example - a procedural manual for code review, and also, a procedure for tracking projects through the office.*

Although these examples could have been considered as external or purely social forces, as was done in the Gruenwald study of architects (1995), a unique property of firms would have been obscured. Architects often described a shared identity between themselves and their firms that was separate from their professional identity. This special property of *firm* was first suggested in the architect change study conducted by the Research Center for Continuing Professional and Higher Education in 1992 (Price and Knowles, 1995). Many

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of the architects interviewed in that study consistently used the pronoun "we" when describing their cases of change. Even when asked by the interviewers to only describe their personal changes, they continued to use "we" rather than "I". Gruenwald (1995) reported in his secondary analysis of data from the 1992 study that the "we" phenomena occurred in 39.5% of change stories. The findings of this study indicate a slightly smaller percentage of 33.9% of changes reported.

The following example illustrates the concept of shared identity. The architect had recently joined a small firm, for which he was extremely pleased to be working. He commented that he could not wait to get to work each day. On his own initiative, he altered his preferred role as a designer and project manager in order to improve the firm's operation.

> *I am spending more time doing administration and info gathering in this firm. This firm is relatively new (two years) some procedures not in place yet. For example we do not have a library. This makes it harder to get info quickly.*

Concern for the welfare of the firm and its employees is evident in this quotation from a principal of a small firm. Also there is the suggestion in the last statement about "quality and profit" that suggests that the firm sometimes moderates between *professional* and *personal* forces.

> *We are doing a better job tracking our hours and setting job goals for staff. This will help us to be more profitable and to produce quality work. It helps us to know which employees are productive so we can reward them. It also helps us to address problems with less productive employees. In general we want to be more responsible. I don't want to be driven by profits only - we need quality and profit.*

Firms sometimes imposed changes upon their employees. Often these changes were accompanied by negative feelings. The following is an example of an architect who was in the process of reluctantly making a change at the request of his firm. It may be inferred from his reluctance that his identity with the firm was in conflict with his image of what an architect should be.

> *The firm has decided to get into the design/build area of practice. I was free so I was assigned to the project. I don't know a lot about it yet; but, so far, I'm not too sure that I like it. The design decisions are mostly made by the contractor. In some design build arrangements the architect serves as the contractor in order to have more control over the design, but in this case the firm is serving as a member of the building team. I don't like the reduced creative input.*

Professional/Firm Forces

The interplay of *professional* and *firm forces* accounted for 19% (n=15) of the changes studied. Often change descriptions revealed the sharing of professional goals between the firms and the architects. In the following

example the architect initiated a change that demonstrates a high degree of concern for both his professional ability and the welfare of his firm.

> *I wanted to improve my written communication skills. I was also tired of getting "redlines" on my memos from my superiors. I asked the chief project manager to review my efforts and give me feedback so that as I took on more responsibility for projects I would not embarrass the firm.*

The following is an example of a self initiated change in which the architect was motivated by both a desire to improve firm operations and insure its professional image. Again it may be inferred that he sees his identity intertwined with the firm and does not wish to be professionally embarrassed by possible mistakes of others in the firm.

> *I am putting a greater emphasis on quality assurance - both for my own work and the other employees. I realized that more time on the documents in the office would save time and money and embarrassment later in the field. This is something I personally initiated.*

Architects also expressed their genuine concern for the welfare of their firms and their own professional goals as indicated in this example.

> *I am doing a lot more contracts, bidding, and specifications now. I make myself get involved in multiple phases of each project that I work on. I do this because it really is a necessity for the firm - because we are small and I have so much more responsibility. By doing each phase, I think all phases of my practice benefit.*

Firms were also critical in providing the architects with opportunities for practice, professional development, and personal fulfillment. This is evident in the following case of an architect who took advantage of a new assignment to improve his expertise.

> *I recently began working on a new building type - a dementia care facility. One of our healthcare clients asked us to design this facility as an addition to an assisted care facility. I was assigned as one of the team members. I feel good about working on this type of project and having the additional responsibility.*

Changes in the type of building projects or new conditions surrounding familiar ones were causes for 11% (n=9) of the changes reported in this study. They also were involved to some extent in ten other changes. Building projects are the products of both professional and firm forces. They are the quintessential element of professional practice; but, the firm determines what projects will be available to the architects to practice on and how the work will be carried out.

Personal Forces

Primarily *personal forces* for change were found in 7 % (n=6) cases. In combination with other forces, personal forces were evident in twenty-eight additional cases. While some of the changes associated with these forces were

simple, such as using personal address and appointment software, most others

represented major *redirections* and *transformations* in the architects' practices

and lives. The following examples express a full range of personal desires, such

as greater income, control over practice, public service, and personal fulfillment.

> *I have redefined architecture for myself. Now it includes all services that an architect in the renaissance may have provided - painting, sculpting, etc. Also I have expanded my view of professional responsibilities - too many services have been "given away" to other trades and professions.*

> *I am currently experimenting with a design build project. I like the control over a project that this affords; and, I like being involved in getting it built like I want. Don't have to scream or "cajole" the labor force to get it done right. Also I may be able to make more money.*

> *Recently I have become interested in politics. I just ran for state representative but lost by about 4% of the votes. Main reason is that I have through my work been able to see many other cities around the country and have been in a position to interact with their governments. I think we here need and can do much better.*

Personal/Professional Forces

The interplay of personal and professional forces accounted for 22 %

(n=18) of the eighty-one cases of change. These changes most often involved

intrinsic satisfaction in achieving a professional goal, increasing compensation,

or enhancing future opportunities.

> *I recently have taken on new responsibilities in the firm. I have shifted from primarily drafting to primarily doing field work. This is part of the firms plans to expand work in this area as we continue to get more clients. This is an opportunity for me. It gives me a chance to do something different and to get away from working on the computer eight hours a day. It is also a little more exciting to get to travel around the country every week. I look at this as not so much a promotion as a change in direction for my career.*

Another form of the interaction between professional and personal forces is reflected in the concept of the *whole architect*. Typically architects in early to mid career reported making changes in order to gain broader expertise in the core areas of practice. Usually the focus of their changes were on building codes, contract administration, or specifications writing. A young architect reflected this desire to be a whole architect in the following comments: "Since graduating from school, I felt that writing specifications was a weak area for me. Also, the way our office is set up and because I am licensed now, I have more responsibility in this area." Sometimes the desire to be a *whole architect* was in conflict with changes imposed upon the architects or with the goals of the firm in which they worked. Several architects cited the need to broaden their knowledge of architectural practice as the primary reasons for moving to another firm. Usually the move was from large firms, in which the architects had

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narrowly defined roles, to small firms in which they by necessity had to perform

a variety of duties. The following example illustrates this concept:

> *I joined this firm 9 months ago. I came from a very large firm in which my job was very narrow in scope. I liked the type of building I was working on but wanted to broaden my scope of services. I felt like I had gotten too far away from design and project management. I was doing more people management. At this firm we are exploring a wide range of services and I get to be part of that as well as other aspects of architecture. There was a time in my career that I needed the job security and opportunity to learn the basics of practice that the big firm afforded me. But now I want to be an architect again.*

Personal/Firm Forces

The interaction of personal and firm forces accounted for 11% (n=9) of

the cases of change. Architects in the study often reported ways in which they

could make their jobs easier or more rewarding while at the same time increasing

the efficiency of their firms. The use of computers and software were common

to many of these changes.

> *I am using e-mail with my clients now. The firm has recently given us access to the Internet that enables us to send and receive e-mail outside of the office. I like this technology. It is very efficient.*

> *I have been using the Internet on daily basis. My marketing duties require me to keep an eye on the Commerce and Business*

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Daily and some other marketing resources. The AIA Online service allows me to do that efficiently. I also use the Internet for my e-mail and inter office memos. Half of my client contacts are done through e-mail.

Architects sometimes initiated changes in order to be more of a part of their firms. In the following case the architect had recently joined a firm in which he intended to spend the remainder of his career. He described how he redefined his role in the firm in order to solve a problem that intrigued him and to enhance his membership in the firm .

I have only been with this firm for about nine months, but I plan on being here till I retire. Recently I have recognized a problem in the firm concerning small architectural projects. I have taken it on myself to try to find a solution to losing money on these projects. I used to have my own firm which was much smaller than this firm, but I made money on what we call a small project here.

Architects who were principals of their own firms exhibited strong personal and firm motivations. One architect reported several significant changes related to the creation and operation of a new firm. These included learning about corporations and Robert's Rules of Order, and taking on new responsibilities for contract administration, specifications writing, and management of computers and information systems.

External Forces

Opposite personal forces on the continuum of forces for change are forces that come from outside the person and their professional lives. Fox et al (1989) created the term *social/regulatory* to describe the effects of relationships with the family, regulations, institutions and colleagues. Previous studies of change among architects have also coded data according to this category (Gruenwald, 1995; Price & Knowles, 1995). However, this study found that certain regulatory forces, such as building codes, were more closely related to professional forces. This study also found that forces related to the association of architects with their firms were distinct from relationships with other institutions. Thus, the category of *external forces* was developed to describe forces of change that come from beyond the firm, profession, and person.

Of the eighty-one cases that were examined, only 4% (n=3) were considered to be motivated by primarily external forces; however, external forces were involved in eleven additional cases involving combined forces. Technological advances were sometimes responsible for initiating changes in practice that were not considered to be necessary to the profession. One architect whose firm had recently implemented a computer network system that he considered to be inefficient commented, "*This is just another skill that I as*

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an architect must fit in."

Social relationships as external forces for change were also evident in the data. Two architects reported making changes related to public pressure. One of the architects provided the following account:

> *We have had some recent bad experiences with the local newspaper. They were only minor problems and misquotes but over the past 2 or 3 years other architects in this area have had some serious problems discussed openly in the press. The media attention is forcing us to be more cautious about what we say in public. It is also forcing us to increase our efforts to check and double check construction and design. I think this probably enhances the quality of our product and process but it is time consuming and painful. It also creates an overall bad impression of the profession.*

Regulatory issues were also present, but were considered to be a combination of professional and external forces. Several architects reported "having to" change to a different national building code in response to its recent adoption by the city in which the architects practiced. However, the architects approached this change with a neutral attitude, and considered this to be part of their professional services. These changes were among the most clearly defined in the study and resulted in the greatest amount of formal learning. Typically changes in codes were more difficult to define. As one architect commented, "It is an ongoing effort to keep up with codes. You must always check to see if one code out of several that apply to our work has changed." The architects tended

to focus on the process of reviewing codes rather than trying to thoroughly learn one or more sets of codes.

Professional/External Forces

The interplay of professional and external forces accounted for five changes. As previously noted, most of these changes involved code issues. They all indicated a concern for professional responsibility beyond meeting the minimum requirements imposed on them.

> *I have increased my emphasis on code reviews. Most of my new projects are using different codes. Although it is tedious to conduct thorough code reviews, I have learned from experience that it is better to understand the code thoroughly at the beginning of a project - including initial presentations to prospective clients - to avoid problems later own.*

Advances in practice technology were often forces for change. Usually the architects perceived them as professional or firm forces. However, one architect had for many years viewed computer drafting as an intrusion on architectural practice and had only recently changed his perception.

> *I used to have a vision that I could get by in my career without ever having to learn CAD (computer aided drawing) but now I don't think so. I wish I could live my professional life like I learned architecture in school and in the workplace. I really prefer to put my hands on it and draw it rather than do it on a computer screen and diskette.*

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This person commented that he had set a goal to learn CAD over the next two years, but, in his words, he viewed this endeavor as "equal to learning a foreign language."

Firm/External Forces

The interplay of *firm* and *external forces* accounted for six of the eighty-one cases of change. Most were related to computers or office policies. In many of these cases the architects displayed negative feelings toward the change and/or the firm. These comments illustrate problems that can arise when the firm or the firm's management intrude in, rather than facilitate, the architect's ability to practice.

> *I am in much more of a management role now than a year ago. The work load with my client increased to the point that the firm thought I needed assistants. The firm is a very political climate and I am not by nature a political person. I am much more comfortable as a doer than as manager.*

Another architect was mildly concerned with his firm's commitment to keeping up with the latest technology, but otherwise accepted the change because it was compatible with his view of practice.

> *We have recently upgraded from AutoCad 11 to 13. The firm is trying to keep up with the industry. I also think that the software is more efficient and will benefit the firm. I am in favor*

of the change and wish that we had made it sooner, we may have waited too long to do it.

Table 3: Frequency of Changes by Forces, Scale, and Type of Change

Forces	Cases		Scale of Change			Type of Change			
	All Cases	N Learning	Small	Moderate	Major	Accommodation	Adjustment	Redirection	Transformation
External	3	1	1	2	0	2	0	1	0
Personal	6	6	2	1	3	0	3	1	2
Firm/External	6	5	2	3	1	4	1	1	
Professional	8	7	1	6	1	0	6	3	0
Personal/Firm	9	7	1	6	2	0	6	6	0
Firm	10	6	2	8	1	2	7	1	0
Professional/Firm	16	12	1	13	1	0	12	3	0
Personal/Professional	18	16	2	11	5	0	10	7	1
Professional/External	6	5	1	4	0	2	3	0	0
Totals	81	65	13	54	14	10	46	22	3

Table 3 lists the number of cases associated with each of the forces for change as well as the scale and type of change. *Firm* and *firm/external forces* accounted for the least number of changes involving new learning. *Personal* and *professional forces* accounted for the greatest number of *redirection* and *transformation* changes.

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Section Four: Learning Related to Changes

Learning, either structured or unstructured, was associated with sixty-five

of the eighty-one cases of change analyzed in this study. Typically the architects

engaged in learning for the purpose of gaining practical knowledge instrumental

to their changes. In some cases the architects made changes specifically for the

purpose of placing themselves into learning situations that would lead to or

solidify desired new roles or states of practice. Typically, their learning

activities were unstructured, involved informal resources, and were embedded

in their current work projects. Although they tended not to plan their learning,

they were often alert to learning opportunities, such as in this case of a young

architect who specializes in building surveys:

> *Recently I encountered a building with some mechanical systems that unfamiliar to me. This was a project in which we had assistance from a mechanical consultant - this happens occasionally on larger or more complex buildings. I was able to get the consultant to explain the nature of this particular system to me at the site while I was conducting my building survey. This is one way for me to expand my knowledge and get my work done at the same time*

Borrowing a metaphor from architecture, the pattern of the architects'

learning could be called *organic*. Frank Lloyd Wright described *organic*

architecture as "an architecture that develops from within outward in harmony with the conditions of its being as distinguished from one that is applied from without." Similarly, the form of *organic learning* among the architects of this study developed from within the conditions of their practices and followed the contours of the professional landscape without the imposition of formal structure. Fox also discovered a similar naturally occurring pattern among physicians, which he has referred to as a *self-directed learning curriculum* (Fox & Bennett, 1996).

This pattern of learning also shares many similarities to the architects' pre professional learning experiences. In the design studios common to nearly all architectural schools, learning is collegial, involves coaching, is directed toward gaining mastery, and is project based (Schon, 1987). Similar conditions were found in 30% of changes that involved learning. These cases accounted for a disproportionate number of major changes and intensive learning efforts. The following story of a young architect's effort to become more proficient in contract administration was typical of these activities:

> *The opportunity came up to do the contract administration for a project I had designed. I was pretty anxious about doing it at first but I got advice from a very experienced project manager through the course of the project. I prefer to solve problems myself as much as possible - I'd rather know how to solve future*

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problems than just get an answer to the immediate problem. But whenever I got stopped or if the results of a mistake would have been costly, I consulted with the senior project manager. Usually it took only about 5 to 30 minutes per situation. I also read all the project documents and got some useful info from some booklets of rules of thumb that I had used to study for the registration exams.

As in a college design studio, the architect above was gaining the knowledge of a complex task while actually doing the task. Unlike the design studio, he had placed himself into a sink or swim situation in which failing to learn could have more serious consequences. The brief but timely consultations with the more expert coworker eased his anxiety and kept him on track. This scenario is very much like the coaching situations that commonly occur in design studios. This case also illustrates the use of *found* learning resources, as in the rules-of-thumb booklets. In architecture, this term refers to the use of building materials that were literally found on the building site or were originally meant for some other purpose.

Purposes, Methods, and Resources for Learning

Architects engaged in learning in all categories of forces for change. They were less likely to engage in learning when changes were associated with primarily *firm forces*. The chance of learning was slightly greater when forces

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involved personal issues. The data further indicates a tendency toward learning for the purpose of gaining problem specific rather than conceptual knowledge - 48 cases versus 35. Problem specific learning was most evident in cases associated with *firm, firm/professional,* and *firm/personal forces,* while conceptual learning was more closely associated with primarily *professional forces.*

Table 4: Learning Methods and Purposes by Forces for Change

Forces	Cases		Methods of Learning						Purpose	
	All Cases	w/Learning	Consultation	Doing	Readings	Observing	Formal (firm)	Formal	Concept	Problem
External			1	0	1	1	1	0		
Personal			5	5	3	1	0	1		
Firm/External			3	4	3	0	0	0		
Professional			6	6	7	3	1	0		
Personal/Firm			6	4	5	3	1	2		
Firm			4	2	3	0	1	0		
Professional/Firm			10	9	10	5	1	1		
Personal/Professional			10	14	13	4	0	4		
Professional/External			4	2	3	1	0	1		
Totals			49	46	47	19	5	9		

Table 4 provides an overall view of the relationships between forces for change, learning purposes, and learning methods. It further indicates the number

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of cases involving learning within each category of force.

Categories of Learning Methods

The analysis of data also revealed six general categories of learning methods: *consultations*, *learning-by-doing*, *reading*, *observing*, *formal programs*, and *formal in-firm programs*. In 80% of all cases involving learning, the learning was more experiential than deliberative in nature. *Consultations*, *learning-by-doing*, and *reading* were by far the most preferred methods; and, formal programs, including those conducted within the firms, were the least used. Formal resources accounted for less that 14% (n= 9) of all resources reported in the data and never served as the sole resource for change.

Table 5: Frequency of changes by Type of Change and Learning Method

Types of Change	Cases		Methods of Learning						Purpose	
	All Cases	W/Learning	Consultation	Doing	Readings	Observing	Formal (firm)	Formal	Concept	Problem
Accommodations	10	6	6	4	5	1	0	0	4	3
Adjustments	46	35	25	28	26	7	5	4	15	14
Redirections	22	18	14	12	13	9	2	4	15	11
Transformations	3	3	3	2	3	2	0	1	3	1
Totals	81	65	48	46	47	19	7	9	37	49

Learning-By-Doing

Learning by doing was evident in 71% (n=46) of the sixty-five cases involving learning. Additionally, in all but six of these cases the architects reported simultaneously learning and doing as part of their regular ongoing work. In other words, learning was embedded in their "billable hours".

> *I am trying to be more diligent in my initial review of building codes at the start of projects. I used the BOCA check list as my main resource and I got help from the chief specifications writer in the firm whenever I ran into a problem. I learned to use the system while also gathering information for use on the project.*

As noted in this and previous examples, learning by doing can be greatly facilitated by a *coach*. In several cases involving learning software programs the architects reported using *virtual coaches* in the form of tutorials and "help buttons" that accompanied the software. The manuals were only occasionally used, and usually then after initial attempts to master the software had failed.

Two cases involving specifications specifically mentioned the use of a specifications guide system called MasterSpec. The architects noted that in addition to the "fill-in-the-blank" templates, Master Spec contained valuable information as to the why and how of the process. As one commented, *"The system itself educates you as you go, so you can just dive right into the material."* While this system helped the architects learn while doing their work,

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it was not considered to be a total substitute for human resources. The architect

in the example went on to say that, *"in order to make good decisions I still have*

to note a problem and talk with someone here in the firm or a contractor or a

product supplier."

Another learning-by-doing strategy was to select projects for learning that

were relatively uncomplicated and low in risk. An architect in the process of

redirecting his practice into the area of design/build approached this potentially

complicated and risky change in the following manner:

> *I am currently experimenting with a design build project.*
> *I've considered doing this for some time, but recently had an*
> *opportunity to do this with a small project that a contractor friend*
> *was too busy to do. So far I have relied on past experience and*
> *am using the project to learn more about this.*

Learning while trying to be productive was not always desired by those

involved, as noted in the comments of these two architects:

> *Learning the new software was not too difficult. One thing*
> *that made it more difficult was that we had to keep working while*
> *making the change over. It would have been better if I could have*
> *had a few days to get familiar with it. I think it took me about a*
> *week to get up to normal speed.*

> *I used a real office project while learning the program and*
> *increasing my spec writing skill. This was really a necessity due*
> *to the amount of time available to me and the need to get the work*
> *done. It would have been nice to have had some coaching or*
> *tutoring but that was not available or possible.*

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Consultation

In 75%(n=49) of the sixty-five cases involving learning, architects gained knowledge through consultations with a wide variety of human resources. Consultations were somewhat more often associated with *professional/firm forces* and less so with *personal/professional forces.* Consultations were typically carried out in small increments of time of less than thirty minutes. Often a series of short consultations was carried out over a long period of time, such as the duration of a project. In recent years the American Institute of Architects has recognized this phenomena by featuring "consultation sessions" as scheduled programs during its national conventions. The types of persons consulted by the architects included the following: *colleagues, coworkers, contractors, product representatives, product suppliers, clients, building officials, mentors, primary consultants, special consultants, partner firms, academics,* and *family members.*

Coworkers: Architects sought advice with co-workers in 54% (n = 27) of the changes involving consultations and 42% of all changes involving learning. Typically the resource cited was a person at or just above the architects position in the firm. An exception, and current phenomena, was the "alpha geek". The

alpha geek was the person in the firm who knew the most about computers. He or she could be anyone at any position or level of architectural experience. In four cases involving large firms these persons were employed specifically as "management information systems" specialists.

Colleagues: Architects cited getting advice from colleagues in 14% (n = 7) of consultations. These cases were all related to architects in early to early-mid level of their career. Colleagues were most often architects with whom the subjects had formerly worked. In addition to being familiar with former coworkers there may have been a bonding factor as well. This is suggested in this comment by one of the subjects:

> *"I intend to continue to experiment with the Internet here and at home following the recommendations of my co-workers and maybe some colleagues outside of this office, although architects don't like to share their knowledge much."*

Architects also reported obtaining information from fellow members of specialized professional organizations or through informal networks. Three architects listed members of the Construction Specifications Institute as resources for learning. One architect referred to the Project Management Institute and another mentioned a project management software users group. One architect, who was committed to producing highly sophisticated designs,

had cultivated a personal network of colleagues who shared his commitment for aesthetic design. These colleagues were located out of state and were not in direct competition with the architect.

Mentors were another form of collegial resource reported by three of the architects. One architect with 30 years of experience reported seeking advice from an architect with whom he had a career long relationship based on personal rather than work related factors. An interesting use of a mentor to make a change was offered by this principal of a small firm:

> *We recently made improvements in quality control within the firm. We brought in a semi retired experienced architect to help write specifications and to act as a mentor and quality control manager. This man had previously been a partner in a firm that I once worked for. We have this person red line our drawings to give us feedback. He also offers observations about the office - such as the quality and organization of our office library and our procedures.*

Consultants: Architects, in general, typically work with structural, mechanical, and electrical consultants on every project. There is usually a history of working with the same consultants, and in the largest firms these consultants are often full time employees. Architects in this study reported using their primary consultants as learning resources in 10% (n = 5) of the cases involving consultations.

Special consultants are sometimes hired to assist in the design of new building types or to address specific technical problems in current projects. Three changes involved learning from *special consultants*. Two architects also reported gaining knowledge from members of *partner firms*. These are firms with which a temporary partnership has been formed for a specific project. Often these outside firms possess special knowledge similar to the special consultants. The knowledge and learning opportunities provided by these firms and special consultants were highly valued by the architects that reported them.

We have learned a lot from the consultant. We have brought in a national expert since we have not had previous experience in this specific type of nursing home. We don't want to make any mistakes by just modifying one of our existing plans.

Knowledge Keepers were another highly valued group of resources and were involved in 14% (n = 7) of all consultations. These persons possessed both general knowledge that could be applied to other projects and specific knowledge that was explicitly critical to the architects' current work. They included building officials, regulatory agencies, and agents of clients. Architects learned from these resources in informal consultations carried out during the normal activities of a project. In one specific situation several architects reported accessing a *knowledge keeper* through a formal learning activity. The

city in which they practiced had recently changed from one national building code to another. The principal of a small firm told the following story of how he responded to this change. His story clearly delineates the nature and importance of these resources.

> *I needed to know this code for my work with and in the city. My focus was on what was necessary for local plan review. I wanted to know more than just what the code is, I wanted to know how the local officials would interpret it. A course was offered by a local branch of our state university. It was 16 three hour sessions long and directly addressed the codes for the city. It was taught by one of the local officials. This eased my mind that I was going to learn both the written code and its interpretation.*

Industry associates: Architects reported learning from a variety of persons involved in the construction industry and related professional services in 28% (n = 14) of consultations. These included general and sub contractors, product representatives, software vendors, and legal and insurance advisors. They were usually associated with learning for specific projects; although, contractors and legal and insurance advisors were also cited as resources for general aspects of practice, such as contract administration or design/build. Product representatives were involved in three consultations. One architect from a small firm commented that access to product information had become a problem, because product representatives were no longer interested in going to the small firms to

provide traditional "lunch time seminars". Software vendors, including technical support staff, accounted for four cases of consultations.

Table 6: Consultation Resources

	Cases	Percent Consultations	Percent All Learning		Cases	Percent Consultations	Percent All Learning
Colleagues				Consultants			
Coworkers	27	54%	42%	Typical	5	10%	8%
Mentors	2	4%	3%	Special	3	6%	5%
Colleagues (out of firm)	7	14%	11%	Partner Firms	3	6%	5%
total colleagues*	31	62%	48%	total consultants*	10	20%	16%
Industry Associates				Knowledge Keepers	7	14%	11%
Contractors	5	10%	8%	Found Resources	8	16%	12%
Product Reps	3	6%	5%				
Vendors	4	8%	6%				
Legal Advisors	2	4%	3%				
total industry*	14	28%	22%	total consultations	49	100%	75%

* some cases contain two or more resources

Found resources: In 16% (n = 8) of consultations, architects reported serendipitous learning from spouses, children, consultants, and clients. Clients were mentioned as *found resources* in three cases involving learning activities unrelated to the clients' projects. These cases included learning to use

the Internet and personal information management software. Spouses and children were also associated with learning about computers.

Reading

Architects reported *reading* as a method or resource for learning in 72% (n = 47) of changes involving learning. Reading was slightly more likely to be associated with *professional forces* and combinations of forces with professional forces. The architects tended not to read academic or research materials; instead, they favored rules-of-thumb, guides, architectural and related magazines, and product catalogues. Table 6 lists the materials cited and the number of cases associated with each resource.

The architects generally did not read in depth. They preferred to scan materials and to only access materials when they were immediately needed to solve a problem, such as in conducting code reviews or researching building material options. There were two extreme exceptions. One architect suffered from dyslexia and relied on experience and conversations with colleagues and coworkers; while, another architect proclaimed to be a "bookaholic" with a personal library of over 2000 books.

Table 7: Reading Resources

Reading Resources	Cases	Reading Resources	Cases
Books		**Product Info**	
Conceptual Books	7	Promotional Materials	6
Code Books	8	Catalogues	5
Time Saver and Graphic Standards	2	**Firm Materials**	
Manuals	4	Project Documents	6
Specifications Guide	2	Office Procedures	1
Project Management Guide	1	**Computers**	
Magazines		On Screen Help	5
Architecture Magazines	6	On Screen Tutorials	5
Allied Professional Magazines	4	**Course Materials**	
Computer Magazines	3	Handouts	4
Architecture Computer Magazine	2	Guides for Self Study	3
Non Architecture Magazine	2	**Other**	
		Regulations	2
		CSI Case Study	1

Observing

Observing to learn was associated with 28% (n = 18) of changes involving learning. This method was often used in combination with consultations and usually involved observing a building or building element. Some of the reading conducted by the architects could be considered as a form of observing. The articles in architectural and related magazines cited by the

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architects were often primarily picture stories about building projects.

Formal Structured Programs

Architects in the study cited formally structured programs as resources in 22% (n = 14) of changes. Five cases involved formal programs that originated within the architects' firms, and nine cases involved programs outside of the firms. Most often the programs reported addressed immediate and specific needs of the architects. The clearest case of this type involved learning a new national building code that had been recently adopted by the city in which several of the architects worked. This change also involved the most intensive learning effort. The architects attended a sixteen week series of three hour sessions taught by one of the local building officials whose job was to enforce the new code.

Other programs addressing the immediate needs of the architects included training sessions offered by a project management software company and a series of "lunch time seminars" addressing the use of word processing, spreadsheets, and other productivity software. The "lunch time seminars" were conducted in the firms using in-house computer experts as instructors.

In four cases architects reported gaining useful knowledge by attending

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presentations offered by professional organizations with whom they were affiliated. These programs were typically less focused on the specific needs of the architects. These programs were most valuable as means for the architects to assess their state of knowledge concerning the area of change and to form an image of what the change would or should be.

Architects also reported serendipitous learning from programs that they attended for reasons other than to address a learning need. One example was an architect needing to learn about steel construction. A representative of a manufacturer of steel joists happened to be invited to make a presentation at the firm during lunch. "Lunch time seminars" were a tradition in his firm as they are in most architectural firms. He gained valuable information from the presentation and was able to contact the presenter for further assistance in developing expertise in steel construction. It is typical for these presentations to be given by product representatives who also provide the lunch. Interestingly one firm that conducted a series of lunch time seminars addressing computer skills and using their own in-house instructor also provided lunch for the employees that attended.

Anticipatory Learning: Formal learning was sometimes used in anticipation of future rather than immediate needs. Two architects who had

taken on new management duties reported using knowledge learned one to four years prior in a series of leadership and personal development courses offered by their firm. These formal programs addressed time management and interpersonal skills. This was a very large firm which had instructors on staff capable of teaching and organizing these programs. This firm also regularly used senior personnel to conduct one day leadership programs for the staff based on more intensive classes they had recently attended. The following quotation describes one architect's use of this learning method to implement a change in firm procedures:

> *I have relied on my experience and on some of the training from in-house seminars on leadership. Everyone in the company has gone through a two day program on interpersonal relations (I did this about two years ago). Also did a "ropes" course. Our ownership and senior management provide leadership classes about four times a year. Typically they go to a two or three day retreat with a consultant and then come back and put on a one day version of the program in-house. We have been focused on change this year which is what I am involved in right now.*

While the architect in the story above found the training to be useful, he also noted that his best resource had been his experience in observing the firm grow over a period of several years. This example also reveals that architects often gain knowledge from formal programs indirectly through consultations with coworkers who have attended programs. *Indirect formal learning* was

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reported in six cases of change. The following are typical statements:

> *To get up to speed on the new city codes we have a person in the office who has concentrated on that issue. He is going to a 16 week code class offered at a local University extension center. Every Monday morning he gives us a report on key items that we should be aware of.*

> *My formal learning was indirect - I rely on the specification writer to go to educational programs and in general keep up with this area. I think that going to a program in codes might be helpful but I am concerned about the cost and time away from office.*

Model Projects

A property common to many changes involving learning was the need to find an image, often a literal image, of the end state of the change. This concept was referred to as *model projects*. As was noted previously, the architects' learning tended to be problem specific rather than conceptual in nature. They sought explicit examples of the changes that they wished to make. These examples described, or literally pictured, the subject of the change or the state of being that the architects or their firms might achieve after the change. When changing to a new building type, the architects would seek model projects in the architectural magazines and general standards books.

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In a case involving the networking of computers, an architect found articles on the subject in both an architectural magazine and a general computing magazine. He commented that, "the architecture articles were useful but not in depth enough. The PC magazines had more information, but didn't address our particular professional needs." Although the PC articles provided more details they did not present an image of what networking would look like in an architectural firm.

The following are examples of references to models of change:

> *If there had been a formal program or conference available on the topic of library design it might have been useful. I would like to see what other firms had done in similar projects.*

> *I have begun reading more publications* about contract documents *from groups like CSI. I look for case studies and try to find out what things to avoid and what things are good practice.*

The architects sometimes used project models as templates to be copied, but more often they were used for subtle purposes. They affirmed that the architects were on course and served as starting points for creating new models unique to the particular projects or the conditions of the architects' practices.

> *Another new building type was a child care facility. I was assigned by the firm to do the preliminary schematic design for this project. My schooling had prepared me for doing this. I checked in the major architectural journals for examples and then proceeded with the design.*

Section Five: Intervening Conditions

The architects' stories of change revealed several *intervening conditions* that affected the forces and the learning strategies for change. These conditions originated within the personalities of the architects, the culture of the profession, and the structures and policies of the firms. The concepts that emerged were labeled as *uniqueness, access to resources, busyness, observability, trialability, compatibility,* and *commitment.*

Uniqueness

At the core of modern architectural philosophy is the concept that each building project is unique. This is somewhat contradictory to the desire of architects in the study to find model projects related to their changes; nonetheless, these same architects often commented on the unique conditions of their work and firms. Usually this was in reference to why they had not engaged in a formal learning activity and had chosen to use familiar resources such as colleagues and coworkers.

> *There wasn't any formal learning involved. I wasn't aware of any programs; and, I'm not sure that general programs would have helped because of the uniqueness of each of our projects due to the combination of building type, client, and specific project factors.*

Some architects also considered their firms to be unique as well.

> *Upper management dictated a format to us, the task team although they paid little attention to what we actually were doing so this gave us some lee way. Very little info was gathered from outside sources. This was due to the belief that no other firm or source would be as up-to-date as our firm.*

The uniqueness factor affected the learning resources that the architects considered to be credible. Typically those human resources closest to the projects or most familiar to the architects were favored over books or reports containing conceptual or scientific information. These persons included consultants, industry associates, coworkers, and former coworkers. Written resources consisted of rules-of-thumb, practical guides, and product literature. In three cases in which the architects reported reading books of a more scholarly nature, the books were written by someone in their firm or partner firm, or a special consultant hired by the firm. Two other architects cited text books from their prior college studies, and one architect reported extensive readings of books that represented rigorous research or scholarship. Other architects in the study may have read or consulted with more rigorous or diverse resources, but

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they did not report them in their change stories.

Busyness

A majority of the architects in the study reported being very busy. The architects often commented that they were too busy to attend formal learning programs or take time to systematically learn before making a change. One architect offered this comment, *"It's hard to be away from the office while we are busy and we are always busy."* This perception of *busyness* resulted in many cases in which learning took place simultaneously with the change. In some cases the architects appeared to be responding to legitimate exigencies of practice, such as in the following example.

> *The issue of master planning on this scale was also new to me but I had little time to learn any new procedures - the job had to be done quickly. I learned as I went through the project.*

Contradictions to a steady state of *busyness* also emerged from the data. Several architects related stories of major changes and learning efforts conducted while continuing a normal practice. While the perception of *busyness* may originate in actual deadlines imposed by the clients, *busyness* may also be a product of the professional culture and/or the practices of the firms. Whatever the reason this condition affected the architects' approaches to change and

learning.

Access to Resources

The architects' access to resources affected change and learning. They tended to use human and material resources that were within "arms length" or "ear shot." These were resources in close physical proximity, such as coworkers or written materials at their desk or in their firm's library. They also were resources that could be contacted by phone or e-mail. Although these resources were often used because of their convenience, the architects also expressed faith in the expertise of these resources. One architect offered this philosophic comment:

> *Most aspects of architecture are not hard to understand when you are surrounded by competent people to help you, at least for smaller projects. The reason I came to this firm is so I could be with more knowledgeable architects. This new firm is fun. I enjoy the work and the people. It is where I want to be - this is the kind of architect I want to be. I really enjoy coming to work every day.*

Firms played an important role in shaping access to resources. Their size, organization, policies, and traditions all facilitated or hindered access to learning resources. Small firms appeared to have a greater problem with access to resources than larger firms. The architect in the previous example valued the

expertise in his new firm, but he also expressed concern for the lack of a library in the firm and the tendency for product representatives not to call on them because of their small size. Large firms offered in-house training opportunities, greater library resources, and more coworkers to draw upon as learning resources. Most small firms were *undermanned settings* in which the architects were forced to take on new roles and duties. While this condition initiated many changes among these architects, it also meant that they had fewer resources to draw upon. A common strategy used by architects in small firms was to seek advice from former coworkers whom they typically had met while working in a larger firm.

The policies and traditions of all firms appeared to be responsible for creating assumptions among the architects that focused learning activities, formally structured or not, were not practical in professional practice. Many architects commented that it was too difficult for them to get away from work to attend formal programs or engage in "non billable" learning activities.

Another restrictive condition related to the firms was their tendency to be *knowledge islands.* Because of the pattern of using familiar resources and the philosophy of *uniqueness* of each practice, the firms tended to build their own knowledge bases and cultures for interpreting and cataloguing them. Much of

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the knowledge created within the firms was stored in project documents not often shared between firms. These included sketches, notes, contracts, working drawings, and specifications. The following story was given by an architect who had recently joined a new firm.

> *There is a real problem going from one firm to another, because so much knowledge is recorded in the documents of each project. It important to be able to find projects that have already solved similar problems. The system of filing documents here needed to be redesigned. Some ideas I brought with me from the firm I used to work for, and I also found some articles on filing systems.*

The isolation of firms was sometimes mediated through a random process of *cross pollination* by way of hiring new employees. As in the example above knowledge passed between firms when an employee from one was hired by another. This occurred in all sizes of firms. The benefit of this transfer of knowledge is described in the following comment:

> *I just started working here recently. I think I provide the firm with a fresh view. This is a good idea for a large firm like this to bring in new person every so often. I have a background in small projects so, I can give the firm some new ideas for dealing with problem they have in that area.*

The study revealed a potential option for expanding access to resources. *The Internet* may soon offer the architects a means of exchanging information between firms not in direct competition and a means of accessing many forms

of written materials. Nearly half of the architects in the study reported using or

experimenting with the Internet. All of the architects had access to computers

and modems necessary for Internet service, and nearly all appeared to be very

comfortable with this technology. The following two comments were typical:

> *I see an advantage using the Internet. You can work with*
> *consultants anywhere. Great way to maintain relationships with*
> *consultants and clients. Potential great resource for information*
> *concerning projects.*

> *The Internet is changing everything so fast. You don't have*
> *to use the Sweet's catalog anymore. You can go directly to the*
> *manufacturer and get the latest information. This is only the*
> *beginning - it will revolutionize the way we do business.*

Trialability and Observation

The ability to try or observe a change affected the rate of adoption of the

change and the attitudes of the architects toward the change. Architects reported

waiting for the right opportunity to try a new form of practice. They also

reported frustration in having to implement changes without first having the

opportunity to observe them.

Compatibility and Commitment

Two very important intervening conditions were the degree to which a

change was compatible with professional ideals and the degree to which the

architects were committed to those ideals. As has been previously noted ,

professional and personal forces were related to the most significant changes

among the architects in the study. While the architects shared an overall image

of the professional practice, they tended to emphasize one or more of four

specific dimensions embodied in this image. The majority of architects focused

to varying degrees on an image of general professionalism, which they often

referred to as being a *whole architect.* Others emphasized the *business of*

architecture. Their changes most often reflected the needs of their firms. Others

emphasized *professional relationships.* These architects were motivated by

their desire to gain the respect of their clients and communities. A small group

of architects emphasized *the art of architecture.* These persons were motivated

to produce designs of enduring significance. The following stories illustrate each

of these images of the profession and describe the learning patterns associated

with them.

The Whole Architect: One of the subjects with a strong desire to be a

whole architect was an early career architect working as a designer and project

manager in a large firm. He told this story about his desire to be more proficient

in writing practice related documents. He wanted to improve his ability to communicate through writing, because he was tired of getting "redlines" on his memos from his superior and because he felt that he should be more professional as his level of client contact increased. He appreciated the opportunities the firm was giving him and he did not want to embarrass the firm as he took on more responsibility for projects. To accomplish his goal, he planned a loosely structured curriculum that involved reading about writing, writing , observation, and feedback. He began by reading a book on writing from an English class he had attended in college. He also looked at communication documents written by the chief project manager in the firm, which he compared to his own efforts. He then asked this person to review his new documents over a period of time and to give him feedback. When asked if he considered using a formal program on writing, he responded that one might have been helpful but time and availability was a problem.

The key elements of this story are that the architect had a clear image of the change, was personally and professionally motivated, used learning resources and methods directly appropriate to his need, received feedback, and engaged in learning that was both conceptual and problem specific.

The Relational Architect: The interview with the owner of a small firm

began with this comment:

> *I really like being an architect. I take great pride in being able to show my work to my family. I especially enjoy taking my children to projects under construction so they can see what daddy does for a living. I am not interested in design awards but rather the relationships I establish between myself and my clients. At the end of a project, if they are pleased then I have succeeded.*

Although the office was modest in decor, the care in which the firm's

work was displayed and the apparent quality of the projects produced by the

firm affirmed the sincerity of this architect's statement. Additionally, two of the

change stories he told were related directly to issues affecting client satisfaction.

One change involved a greater emphasis on code reviews. He had

recently run into a problem caused by not being aware of a small change in the

building code. This embarrassed him with his client, and he committed to not

let it happen again. He designated one person in the firm to become the expert

on codes, and he paid for this employee to attend a sixteen session course on the

code most often used in the firm's work. During the time this person was

attending the course, the architect scheduled meetings each Monday morning so

that person could up date him and the rest of his staff on key issues that they

should be aware of.

The architect also implemented new policies requiring that all documents be checked by another person in the firm before leaving the office. To establish this policy he hired a semi-retired architect who had many years of practice experience. This person was given the title of quality control manager and asked to check all documents and to give advice to all members of the firm to improve their ability to produce quality documents.

Two other changes reported were less directly involved in improving quality, but contributed to the firm's ability to produce quality work. He had just up-graded the firm's CAD software to the latest version and had replaced several computers. Although he himself only occasionally used computers, he stated that he was totally committed to keeping up with the latest technology. The second change involved an improved computerized system for tracking projects through the office. Through the use of the system he was better able to focus on productivity problems. He made the point that this was both an effort to improve profits and quality by helping his staff identify areas for improvement. The resource for helping him implement this system was his wife, who was also the firm's bookkeeper.

In each of the changes reported by this architect, the purposes and

learning resources involved professional and personal relationships. The key learning element was the organic nature of his learning. He had created an environment for ongoing learning rather than distinct learning events.

The Business Architect: Some architects in the study tended to emphasize the importance of architecture as a business. They did not reject other professional values but rather recognized that their firms must be profitable in order to provide opportunities for practice and to provide them an adequate income. An example of this form of professional commitment was offered by the principal of a recently established small firm of four persons. The firm's office was located in an architecturally interesting building and was very professional in appearance. The architect's work further reflected a high level of design ability. The changes he reported reflected his concern for the survival of the firm.

A majority of these changes involved greater use of computers for the purpose of increasing his firm's efficiency and ability to promote future work. The first change he cited involved using a lap top computer and video projector to make presentations to clients. Because he was already computer literate, he was able to accomplish this change with a minimal amount of learning. He also

found the new way of presentation to be very compatible with his image of practice.

> *I like the method very much. It is very flexible compared to pinning up a bunch of fixed drawings. I can also focus in one part of the project if necessary and enlarge it for all to see while discussing it. Much more interactive. Requires some careful preparation. You must know where all the necessary files are on the computer. Also be careful to hide all the game icons that your kids stick on it.*

He had also recently upgraded his *AutoCAD* drafting software to the latest version and switched to a new *Softdesk* "writer" program that increased the capabilities and productivity of the basic CAD program.

He also had begun to use e-mail extensively to transfer files via an Internet Service Provider. This made it possible to handle out of state work more efficiently. He was also using the Internet to find information about products and manufacturers and was enthusiastic about the potential of the Internet to help in his practice. One idea he was investigating was to use an architectural firm in Mexico to produce working drawings, which would be reviewed and received by way of the Internet.

The knowledge necessary to make these changes was primarily gained through self directed activities. He received some help from his 17 year old son who he reported being "into computers in a big way." He also read articles

from a specialized CAD user magazine and a generic PC magazine. For the *AuotCad* upgrade he used a tutorial built into the *Softdesk* system. He also continues to use these resources as needed while working on projects. Additional to these self directed activities, he took advantage of a national satellite teleconference on the uses of the new *Softdesk and AutoCAD* upgrades. This program was about 3 hours long and was hosted at a local votech school. He commented that he was not ready to use all the things that he learned about in the program but now had an image of where he will probably be a year from now.

Key elements of this case are the architect's concern for the survival of the firm, an emphasis on efficient use of manpower and equipment, highly motivated and self directed learning, a willingness to participate in formal programs that met his specific needs, the use of found resources, and his willingness to make changes. This last point is of special interest considering that some architects indicated that computers were not really part of the culture of architecture. He, on the other hand, had detached the means of practice from the results of practice.

The Designer Architect: Few architects in practice are primarily

committed to the pursuit of art in architecture. Most, if not all, architects are concerned for the aesthetic quality of their buildings and the built environment in general, but usually their efforts are tempered by the constraints of deadlines, profits, and client demands. They are also limited by their innate talent and motivation to develop their talent. In the sampling of architects interviewed for the study one subject represented those architects dedicated to design. He was the principal of a thirteen person firm whose work has received numerous design awards. His firm's office was a showcase for design skills and embodied his image of the profession. The following is his description of a specific change in one aspect of design and his account of his ongoing efforts to improve his design abilities.

> I read a lot - I am a "bookaholic". I read both practical and artistic books. I am especially interested in environmental art. Recently I have focused on the importance of landscape as an element of design. The technical aspects of landscaping I leave up to my consultant. My goal is to understand the process of landscaping rather than the details of species etc. So far my readings have been the best resources in my learning. I have looked at maybe a dozen books on prairie grasses. I have also read some design journals and have attended lectures that included discussion of landscaping, although I did not intentionally go for that purpose. I am always on the lookout for a good lecture on architecture or topics related - I am a student of the world.
>
> Having committed to working in this state, which is isolated from the major cultural centers, I have to read because there are

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few opportunities for lectures or discussions with leading designers and artists. When I travel I always make a point of seeing the most interesting architectural projects in the area I'm in. I also try to attend at least one program at Harvard's summer institute for architectural professional development each year. Also, over the years I have been very active in the local AIA. One of the reasons I did this was so I could invite interesting architects to come here to speak. I have gotten to know some of these people personally and maintain a network of great designers with whom I can exchange ideas.

The key elements of this story include the architect's high energy level and motivation to learn, the clarity of his overarching rather than short term goals, the use of multiple learning resources, the extraordinary seeking out and development of resources from beyond the immediate arena of practice, the emphasis on conceptual and broad scope knowledge, and the emphasis on reading scholarly books and journals.

Summary of Findings

The purpose of this study was to identify patterns of change and learning among architects and to develop theories and propositions concerning those patterns. In order to accomplish that goal, interviews were conducted with a selected group of twenty-seven practicing architects. Questions asked during the interviews sought to disclose the nature of recent changes among the architects. The architects were asked to describe what had changed recently in their practices, why the change was made, and how it was made. An analysis of the answers given to these questions constituted the findings of this study and have been presented here in this chapter.

The architects identified 130 incidents of change. Within the time limits of the interviews, 81 of theses incidents were discussed sufficiently to be used as data for analysis in the study. A variety of skills and knowledge for practice were represented in the change stories. The two greatest areas of change were related to computers and issues of quality control. Computers and software accounted for 30% of all changes, and quality assurance and project management accounted for 20% of changes.

Four general types of change were identified from the data. These types

were very similar to those discovered by Fox et al (1989) in their study of physicians. Small reluctant changes primarily driven by forces from outside of the individual or the profession were labeled as *accommodations*. Moderate incremental changes to practices were labeled as *adjustments*. Larger changes involving structural changes to practice were labeled as *redirections*. And, major changes primarily driven by personal forces were labeled as *transformations*. Adjustments accounted for the greatest number of changes (57%).

The reasons for change were also identified in the study. These were categorized into four primary groups of forces for change. These forces were conceptualized as existing on a continuum with *external forces* originating from without the person at one end and *personal forces* originating from within the person at the other. Between these two polar forces were *professional forces* originating within the architectural profession and *firm forces* originating within the architects' work settings. The greatest number of changes were associated with professional forces in combination with personal or firm forces. The least number of changes were attributed to external forces.

The analysis revealed that new learning was involved in 80% (n = 65) of the changes studied. Most learning was informal in nature and was referred to

as *organic*, meaning that it developed from within the particular conditions of the changes and followed the natural contours of the architects' practices rather than through an imposed structure. Typically the architects learned through brief consultations with coworkers and colleagues carried out while working on a new building project or implementing a new office role. While consultation and learning by doing were the most reported methods, architects often supplemented them with readings, observations, and occasionally formal programs. Formally structured programs, both in the firms and outside of the firms, were cited in only 14% of changes.

Generally, learning was directed toward solving immediate problems rather than gaining conceptual knowledge. Problem specific learning was most often associated with firm and firm related forces, while conceptual learning was associated with personal and professional forces. Relative to types of changes, learning methods were evenly distributed with two exceptions. Observations tended to be associated with *redirections* in practices, and formal learning was found almost exclusively in cases of *adjustments* and *redirections*.

Analysis of the data also revealed *intervening conditions* affecting changes and learning strategies. The rate of adoption of changes and the learning methods associated with them were affected by the degree of

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opportunity to observe or try changes before they were implemented. Often by necessity, or by the perception that they had no time to learn, architects adopted changes and engaged in learning simultaneously. The perception of being too busy to learn in a structured manner was commonly expressed by the architects. Learning was most often embedded in the architects' projects, and little time was given to reflecting on knowledge gained during these projects. The belief among the architects that all projects and firms were unique also contributed to this form of learning. Models of projects or practices were often sought during changes; but, typically they served as points of reference rather than standards to be precisely followed. Architects in the study also suggested that firms tended not to share information. This further contributed to the isolation of knowledge within firms.

In addition to this overall pattern of *organic* learning, sub patterns emerged in relation to specific images of the profession and the degree of commitment of the architects to those images. The architects, while sharing a general overall image, tended to emphasize one or more of four aspects of the profession.

A majority of the architects reported changes in skills and knowledge that contributed to them becoming *whole architects*. Primarily these were areas of

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practice not emphasized in the architects' education and not their first areas of interest in practice. These included project specifications, building codes, and contract documents. The architects chose to make these changes out of a sense of professionalism.

Other architects in the study focused on the business of practice and the financial success of their firms. Their changes involved issues of efficiency and productivity, which, at the time of the interviews, were primarily associated with computerized drafting and management systems. Learning in these areas was more likely to involve standardized procedures; although, it was typically carried out during the normal course of work.

A few architects focused on an image of practice in which relationships with clients, community, and family were most important. Their changes involved issues of quality in the areas most likely to cause problems within their client relationships, such as the code and plan review process or roofing and mechanical systems. Learning associated with these changes tended to be long term and incorporated into the office structure. One strategy was to employ an expert within the firm to assist staff in improving in these areas during the normal course of work. Formal programs were also used if they were available and if they addressed the issue thoroughly.

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The final pattern of change and learning was exhibited by architects for whom aesthetic design was central to practice. Learning for design involved a variety of methods and resources and was generally directed toward gaining conceptual knowledge. Design oriented architects were more likely to study specific issues of design, such as lighting or historical preservation, in great depth and as ongoing research projects. They were also more likely to engage in serendipitous learning activities, both formal and informal, and to reflect upon their learning and experiences. Reflection was often done through networking with other design oriented colleagues.

The findings revealed answers to the basic questions embodied in this study. Many of the answers were consistent with existing concepts of change and learning among architects and all professionals. Other answers have provided new perspectives and challenged the old. Chapter Five further discusses the implications of these findings and offers propositions for a theory of change and learning among architects.

CHAPTER V

CONCLUSIONS AND DISCUSSION

This study sought to identify patterns of change and learning among architects and to develop theories explaining those patterns. A selected group of twenty-seven architects were asked to describe recent changes in their practices and why and how they had made them. Answers given to these questions were analyzed using the qualitative methods as recommended for grounded theory research. The structure of the analysis was further guided by concepts developed in Fox et al's (1989) study of change and learning among physicians. Chapter V summarizes the theories of change and learning that emerged from the analysis of the data. These theories are applicable only to the architects in the study, and are offered as propositions to guide further research toward formative theory. The propositions are followed by a discussion of issues that arouse during the study and the implications of the study's findings for architectural education. The final section of this chapter draws attention to unresolved issues from the study and offers recommendations for future research.

Conclusions

Forces for Change

Four primary forces initiated and sustained changes among the architects in the study. Professional forces were associated with 58% (n=47) of the 81 changes studied. These forces originated within the culture of architecture and found meaning in the images of practice held by the architects. Forces from within the firms in which the architects worked were involved in 49% (n=40) of changes. These forces came from a unique set of conditions that resulted in architects identifying with both the profession and their firms. Personal forces, such as well being and curiosity, were associated with 41% (n=33) of changes when combined with other forces. External forces originating in relationships to society and regulatory institutions were associated with 19% (n=12) of changes in combination with other forces. The following propositions describe the relationships between forces and changes:

- External forces are least likely to lead to changes in practices.

- Professional/firm and personal/professional forces are most likely to lead to changes in practices.

Methods, resources, and purposes of learning were also identified by the

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architects. The purpose of learning was most often to gain solutions to specific problems rather than conceptual understanding of the problems. Problem specific learning was involved in 72% (n=47) of changes involving learning; while, conceptual learning was involved in 54% (n=35). The following are propositions describing the relationships between forces for change and purposes of learning:

- Firm forces and external forces for change are less likely than personal and professional forces to lead to new learning as a means for change.

- Conceptual learning is more likely to be associated with professional and personal/professional forces than problem specific learning.

- Problem specific learning is more likely to be associated with firm, personal/firm, and professional/firm forces than conceptual learning.

Learning Methods and Resources

The architects in the study most often engaged in a form of *organic* learning. This learning involved acquiring knowledge simultaneously with doing the task or fulfilling the role that required that knowledge. It also involved using informal resources in an unstructured sequence of learning events. To guide

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them in these efforts, architects often sought out concrete models of what the change would look like. These models were rarely followed explicitly, but rather served as reference and starting points.

Resources for learning were typically within arms reach or earshot. Material resources included articles in architecture magazines, quick reference books, product literature, and past project documents. Human resources were typically coworkers or consultants whom they worked with on a regular basis. Colleagues outside of the firms were sometimes used, provided that a relationship existed that transcended professional jealousies and the proprietary nature of knowledge within the firms. Relationships were established through previous work experiences or membership in special interest professional groups. Informal networks of colleagues and mentors were rarer but were considered valuable resources by those that used them. Found resources, such as clients and family members were also noted.

Formally structured programs were reported in 14% (n=9) of changes involving learning, and they were always accompanied by informal learning. The lack of opportunity for formal learning in the immediate area of practice may have affected its use. Oklahoma has fewer than 1000 architects working within the state. There may not have been a critical mass necessary to support formal

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programs. On the other hand, this percentage of use is consistent with the findings in both the physician change study (Fox et al, 1989) and the previous architect change study (Price and Knowles, 1995).

The following propositions describe relationships between changes, learning methods and learning resources.

- When new learning is associated with change, the resources for learning are more likely to be persons or materials from the home or work place.

- The initial stage of change tends to involve new learning directed toward finding concrete models of the desired change.

- New learning associated with change is most likely to involve learning-by-doing combined with brief consultations with coworkers or colleagues.

- Formally structured learning methods are least likely to be associated with change.

The choice of methods and resources for learning also varied in relation to the specific area of competency sought by the architects. Incremental changes related to computer aided design/drafting software most often involved learning-by-doing and the use of embedded tutorials and help screens, while engaged in actual work. Other computer related topics, such as word processing and spreadsheets, were more likely to involve assistance from in-firm experts. These

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human resources served as informal coaches and, occasionally, as instructors in structured in-house programs.

Learning involving building codes or new building types involved more informal consultations with in-house experts and coworkers. Learning for these purposes was also more likely to involve persons from outside the firm who were in key gate-keeping positions, such as building officials and client project coordinators. These persons were referred to in the study as *knowledge keepers*.

In addition to coworkers and colleagues, changes related to new building designs or construction methods were more likely to involve observations of model projects, either in person or through magazines and reference books. The conclusion drawn from this evidence is that the architects had a more or less common learning pallette from which they would select methods and resources perceived to be appropriate for specific changes. Recent research by Fox and Costie (1996) also found a relationship between the nature of resources used and the adoption of specific innovations among radiologists. The following proposition describes this relationship:

- Changes involving specific areas of practice are associated with specific learning methods and resources drawn from a common group of preferred methods and resources.

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Types of Change

A typology of change first used by Fox et al (1989) to describe changes

in the practices of physicians was also found to be suitable in describing changes

among the architects. These changes were the result of the forces and learning

for change. *Accommodations* were typically small reluctant changes, which

often involved minimal efforts by the architects. *Adjustments* were moderate

incremental changes to practice that involved greater effort and learning.

Redirections were larger structural changes in practices that required greater

effort to accomplish. *Transformations* were major structural changes that were

often personal in nature and involved long term commitments. The following

are propositions describing the relationships between forces for change, learning,

and the resulting types of change:

- New learning is associated with most *adjustments, redirections,* and *transformations.*

- *Accommodations* are most likely to be associated with negative feelings and are least likely to result in new learning or to involve learning-by-doing.

- *Adjustments* are associated with both positive and, to a lesser degree, neutral feelings and are most likely to be associated with problem specific learning.

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- *Adjustment* changes are most likely to be associated with professional/firm and professional/personal forces and are least likely to be associated with external, firm/external, and professional/external forces.

- *Redirections* and *transformations* are most likely to be associated with positive feelings and to involve new learning directed more toward conceptual understanding than problem specific solutions.

Discussion

The Special Role of Projects

Much of the work done by architects is referred to as projects. Many of the changes reported in the study involved learning directly related to these projects. Architects often used data or other relevant information from current projects while learning a skill. A common example was the learning of new computer software. More dramatically, projects were often both the goal and means of learning. This was typical in changes associated with new building types or office roles.

Learning embedded in projects had two innate advantages. First, it was financially efficient because billable work could be produced while learning took place. Second, it was educationally efficient because the connection between

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knowledge learned and its application to practice was explicit.

Learning of this type also had two disadvantages. First, little time was given to reflecting on learning, thus the opportunity to obtain understanding at the conceptual level was diminished. Second, the use of projects as a method of learning meant that very complex or high risk changes were less likely to be attempted. Architects reported waiting for the right project to implement a change. Sometimes the right project was not available before another project demanded the new practice. Learning attempted under these conditions was stressful. Often firms brought in special consultants or partner firms to do the actual work. In these situations members of the firm used the consultants as resources for learning about the new practice.

Projects were also important to learning as sources of past knowledge and experience. Much of the learning and research conducted for each project was literally embedded into the drawings and documents necessary for the construction of the buildings. The degree and ease of access to this information affected the efficiency of the architects learning. Knowledge stored in this fashion was rarely shared between firms.

The Central Role of Experience

The descriptions of learning-by-doing and of knowledge embedded in projects that were collected in this study demonstrate the central role that experience plays in structuring learning and organizing knowledge among professionals. They further support Schön's (1987) concepts of how professionals construct knowledge based on their experiences in practice.

While learning from experience has long been assumed, the actual process was unclear until Schön's recent work. Houle (1980), for example, described experience in practice as a means of internalizing primarily technical knowledge through a process of repetition, which he referred to as *performance*. Schön, on the other hand, proposed that experience serves a more important function, that being to develop professional mastery.

Schön argued that professionals are often confronted with situations that require reasoned judgements for which technical knowledge may not be available. This surprise leads professionals to reflect upon what is going on and what they can do about it. This in turn leads to on-the-spot experiments and further reflection, all while in the act of resolving the problem at hand. Through this process of *reflection-in-action*, professionals have the opportunity to restructure their strategies of action, understandings of phenomena, or ways of

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framing problems (Schön, 1983; 1987). Schön suggested that a relationship exists between the ability to think reflectively and professional mastery.

Schön's curiosity as to how mastery could be taught led him to study the education of architects. Specifically he studied the design studio method of teaching that is common to all architecture schools (1987). He discovered that architecture students learned by doing under conditions of ambiguity and with little technical knowledge to guide them. Learning was facilitated by brief conversations with instructors and peers during the process of designing a project. Instructors acted as coaches who helped the students think through solutions and keep on track. Peers provided their fellow students immediate information on technical issues and feedback on proposed solutions.

This study found evidence that architects in practice continue to learn much in the same manner as they did while in school. There were examples of reflection upon surprises in practice that led to changes in assumptions about practices; and, there were examples of coaching and peer learning. Some substantive differences between design studios and in the work place were also apparent. Architects in practice were less likely to experiment in practice due to the risks involved in real projects, and they were more likely to receive direct answers from their "coaches" rather than help in thinking through solutions. In

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some cases there were no "coaches" available, only peers or industry associates. Nonetheless, several important similarities remained. Architects acquired an array of skills and knowledge while working on projects, and their thoughts and learning about practice were embedded in the experiences of practice.

The Special Role of Firms

Firms affected change and learning among architects in the study in five important ways: First, they were the instigators of changes. These ranged from simple procedural changes related to the function of the office to role and skill changes related to the firms' needs to be productive and profitable.

Second, the firms were the arenas of practice and the source of projects that the architects used to make professional and personal changes. For many architects the firm was a finite world in which buildings only had meaning in terms of designs and drawings. Typically, architects spent far less time in the field observing their creations being built than they did working in the office; and, in some instances architects never saw the buildings for which they developed construction documents.

Third, an architect's image of the profession was often blurred with the image of his or her firm. It is commonly assumed that architects often join or

create firms that reflect their personal orientations and images of the profession. When professional and firm identities intertwine, they form a powerful force for change. The image of the firm and the profession can also be in conflict, which can also be a force for change.

Fourth, firms were the primary settings for learning. The structure of work and the proximity among workers encouraged learning from colleagues during the regular course of working on projects. Several architects noted that the value of a firm as a learning resource was the primary consideration for leaving or joining a firm. Some architects reported joining firms for the purpose of learning even though they had a weak professional identification with the firm. The architects in such situations often formed strong relationships with coworkers who remained resources for learning after the architects left the firms.

The influence of architecture firms on learning and change was affirmed in a study of learning organization theory by De Monchaux (1993). She concluded that two common learning organization theories involving the development of team learning and shared vision were a natural occurrence in architecture firms. She attributed this to the moderate size of the firms, the physical proximity in which the architects worked, and the traditional team-like approach to work projects. These conditions reinforce findings in this study that

indicated a tendency for architects to use coworkers as their primary resource for change and to learn by doing actual work.

Other conditions within firms also affected the architects learning. Because architects tended to use resources for learning that were immediately accessible, they were dependent on the quality of firm libraries, in-house expertise, and policies for professional development. Some firms were large enough to justify organized training efforts within the firms and using in-house experts. Most firms, however, provided little support for change and learning and often implemented changes in a sink or swim fashion. Firms created a prevailing atmosphere of *busyness* that discouraged architects from participating in structured learning activities or any learning activities that did not result in billable hours.

The fifth aspect of firms affecting change and learning was their tendency to restrict the free flow of practice knowledge within the profession. A major cause for this condition was the free market nature of architecture, which requires firms to compete with each other for work on a project by project basis. Collegiality is further hindered by the culture of the profession that promotes competition for status and self-referenced achievement in the form of design awards and publication of work in professional magazines.

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The commonly held belief that all projects and firm practices were unique further isolated knowledge within firms. Architects were often only interested in knowledge of designs or practices from other firms as points of reference to assure that they were not too far outside professional bounds or to give themselves a starting point for their own interpretation of a particular issue.

The Interaction of the Individual and Professional Culture

The findings of this study affirm Nowlen's concepts that performance and learning in the professions is influenced by the interaction of individual characteristics and the professional culture. According to Nowlen the relationship between continuing education and performance cannot be fully understood through the study of the decontextualized individual (1988, p.69). Indeed, architects in the study made meaning of knowledge and learning activities through the customs, speech, values, and systems of thought indigenous to architecture. For example, they rarely used research based knowledge, and they often questioned whether general knowledge of practice could be applied to their own unique situations. It is doubtful that physicians or accountants would hold a similar view of knowledge.

Architects were relatively comfortable with ambiguity. They often

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reported learning new skills or knowledge by intentionally immersing themselves into actual practice situations in which they would have to learn. This may be a characteristic of the personality of architects and/or the nature of architectural practice that gives architects the confidence that order will eventually emerge from apparent chaos. Architects in the study sought both reliable proven patterns as well as new creative patterns within the chaos of projects. It was the creative patterns, however, that they most highly valued. The profession as a whole expresses this value explicitly in the preoccupation with awards for building designs and in the emphasis on unique and different designs by the architectural press. Again, it is doubtful that other professions would view creativity in practice in the same light.

The study also found evidence of the effects of the interaction of personal characteristics with the professional culture. Architects in the study shared an overall image of practice, but within that image they expressed varying degrees of commitment to one or more of four aspects of practice. Most were oriented toward general professional competence, while others were oriented toward design, business, or service. The effects of professional orientation were most apparent in cases involving those who were most committed to one of these images. Architects oriented toward design appeared more likely to be involved

in intensive conceptual learning effort. Those oriented toward enhancing productivity or client service appeared more likely to be involved in problem specific learning. Architects concerned with their overall competence appeared to be involved with both conceptual and problem specific learning. In each of these cases professional culture and individual characteristics interacted to form what Nowlen described as the double helix that structures performance in practice.

Current Issues in the Profession

Although the research for this study focused on the fundamental patterns of change and learning among architects, it also revealed substantive information of current interest to the profession.

Computers and the profession: The study found a high percentage of changes related to computers. This raised some interesting questions about the direction of the profession. Computers and software are primarily tools *for* rather than knowledge *of* practice or design. This suggests a possible concern for how architects allocate their time and resources for professional development. From the statements of the architects, there appears to be no foreseeable end to changes related to computers and information technologies.

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As one subject put it, "change in computers is ongoing - it is a spiraling vortex that has us in its clutches." The scope of these changes also raise questions concerning the very nature of practice. In the words of another architect from the study, " computers are like a virus that has infected every aspect of practice."

The Internet: While architects have been slow in adopting computers for drawing and word processing, they appear to be enthusiastically adopting the Internet into practice. Currently there is only a small amount of useful information for architects on the Internet, but the consensus of architects from the study was that this media holds great promise for the future of practice. It is available to many architects now and it is as accessible as using a telephone. With perhaps one exception, the architects were very comfortable with using the browsing software and using the information that they retrieved. This media facilitates consultation with both familiar and distant colleagues, and it provides information as the architect needs it, which fits with current learning patterns. Finally, this media has the potential to greatly expand the architects' access to scholarly and research based knowledge, which may eventually lead to a more knowledge based profession.

The Environment: Changes related to issues of the environment, such as

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interior air quality and conservation of resources, were conspicuously absent from the study. Although this is consistent with Gruenwald's findings, in recent years environmental issues related to architecture have received a great deal of attention in the professional and popular press. Some environmental issues are at the stage of social concern, such as the use of timber from the rain forests, while others, such as asbestos abatement, have become regulated by code and law.

After the first ten interviews, subjects in the study were asked specifically if they had recently made changes related to the environment. One architect reported that she increased her knowledge of environmental properties of materials as part of a broader change involving her ability to write specifications for buildings. No other references to the environment appeared in the interviews. It is not clear if the subjects in this study had already adjusted their practices to these concerns, had ignored them, or were waiting to make changes.

The client and the community: An encouraging sign for the profession was the emphasis of many of the architects on improving the quality of their services to their clients. These improvements were in areas more valued by clients than architects, such as interpreting building codes, cost estimating, and project scheduling. Architects also expressed interest in expanding services into

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areas of greater responsibility such as design/build. These issues are currently the focus of efforts by the American Institute of Architects to increase the value and influence of architects in the construction industry and society in general.

In the recent past, architects often viewed building codes and zoning regulations as unnecessary limits on their designs - even as personal affronts to their professionalism. This study has indicated that architects are much more accepting of the role codes play in practice. They have become more proactive rather than reactive in their approach to codes, specifications, and contract administration. This comment about the Americans with Disabilities Act from one architect in the study illustrates how the interpretation of codes has become more a part of the profession:

> *"We sometimes have to educate the local building officials as to the prevailing code because they may be using an old city code that the federal code, such as ADA, supercedes. Sometimes this creates a problem for us because they don't understand that we must comply with the ADA."*

Greater responsibility: The architecture profession in the recent past was very concerned with issues of professional liability. To avoid rising insurance costs the profession developed policies and contracts that limited architects' exposure to litigation. This resulted in a reduction of responsibility, which in turn has reduced the influence and value of architects to their clients. Architects

in the survey indicated that they were willing to assume more responsibility now and were acquiring the skills necessary to prevent problems rather than avoid problems.

Comparisons to Previous Change and Learning Studies

In contrast to Gruenwald's analysis of the architect change study of 1992, the findings of this study revealed very few changes involving marketing of services. Demographic differences in subjects and changes in economic conditions may account for this difference. Over 75% of the subjects in the 1992 study were principals of their firms compared to 26% in this study. A reasonable assumption is that principals of firms take more interest in marketing. Also, the somewhat depressed state of the architectural economy in 1992 likely stimulated greater marketing efforts. Coincidentally, two of the incidents of marketing change in this study were attributed to downturns in the amount of work in the architects' firms. Overall, most architects in the study reported being quite busy.

There was general agreement with the theoretical propositions of the physician study. Areas of exception focused on the role of the work place as a force for change, feelings toward industry regulations, and the nature of

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knowledge for learning. The architects' work places influenced change and learning to a much greater degree than those of the physicians. Architects expressed less negative feelings toward regulations of their practice. This in part represents a reframing of the relationship between building codes and the profession. It may also indicate that the routine practices of architects are less regulated than those of physicians; and, thus, architects have not reached a point of frustration.

Substantive differences between the physician and architects studies were also found. The scholarship and depth of resources used and the degree of collegiality appeared to be substantially less among the architects. Architects tended to rely more on anecdotal information from familiar resources and rarely used research based knowledge. Of particular interest was the difference in sharing of practice knowledge. Architects were less likely to share knowledge learned in practice with the profession as a whole.

Recommendations

Implications for Practice

If the propositions presented in this study are found to reflect patterns of change and learning among all architects, then persons involved in the planning of architectural continuing education or the implementation of changes in practice should consider the following implications.

Change and Learning: Learning is critical for the implementation of most changes. Changes are often delayed due to a lack of learning or because unplanned on-the-job learning would be too risky. Learning is generally more efficient and effective when the learner has a clear goal in mind and a plan for achieving it. Performance and learning are closely related.

Formal programs: Architects are less inclined to use traditional formal programs in order to make changes. If readily accessible, architects will use simple, conceptually-oriented programs to assess and clarify their need for a change. They will also engage in long-term, in-depth programs if the content explicitly meets an important pending need. This requires that the architects be aware of the approaching need and the connection of program content to their practice situations. Formal programs will almost always be used in combination

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with informal resources, usually within the firms, in order to make a change.

Project Learning and Consultations: Most incremental changes in practice involve learning embedded in ongoing projects. Architects learn from doing the projects and from brief consultations with easily accessible and familiar resources as the need for knowledge arises. Architects should have ready access to qualified resources during the course of working on the projects. Access can be achieved through communication technologies such as the phone or e-mail. Written guides or computer tutorials can substitute for human resources if these materials are designed to follow the flow of the work. Opportunities for reflection and evaluation of learning with projects is rarely done, but would most likely enhance the value of the learning experiences.

Firms: Firms are critical to change and learning among architects. The architects' professional goals are often intertwined with those of the firms; and, it is in the firm that most changes and learning take place. Policies of the firms, explicit or tacit, either facilitate or hinder learning.

Because there is a definite relation between change in practice and learning and a probable relationship between performance and learning, firms should consider facilitating learning. They should begin by creating an atmosphere that values learning. This must be a tangible act, as in the form of

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time off for learning or linkages between learning and bonuses. Firms should support and encourage individual employees to develop special areas of expertise so they can serve as resources for others - they will, according to the findings of this study, serve as resources no matter what their level of expertise is. In this regard, firms should consider supporting memberships in special associations or groups focused on special areas of practice. In depth formal learning in these areas may also be effective. Firms should provide opportunities for reflection on learning from current projects. This may be in the form of mentoring, debriefing sessions, or white papers. For changes too risky to implement with current projects, firms might consider encouraging participation in less complex *pro bono* projects. Firms should also consider providing access to formal programs in the areas of time management, leadership and interpersonal relations.

Implications for Continuing Professional Education

Chief among the implications for the broader spectrum of continuing professional education, is that similar overarching patterns of change and learning appear to be shared by professions as divergent as architecture and medicine. With the exceptions noted, particularly the role of firms, there was

basic agreement with the concepts and propositions developed by Fox et al (1989) in their study of physicians. Perhaps the most important commonality is that experience serves as the organizing principle for learning in practice.

The study also indicated that culturally based differences between professions must be considered as well. Architects and physicians may both use reading as a resource for learning, but the depth and content of their readings are very different. They both may use colleagues as resources, but the conditions for using these resources and access to them are quite different. The study revealed that the architects were much less independent than the public image of the profession would suggest. Thus, more consideration must be given to learning in a highly social team environment, than perhaps would be necessary in the medical milieu. These differences originate in the customs and work conditions peculiar to each profession, and ultimately they color the process of change and learning.

Future Research

This study was designed to develop possible theories explaining the relationships between change and learning among architects. It has successfully produced a number of relevant propositions, each of which represent an issue for

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further research. Of particular interest is the use of specific learning resources in relationship to changes in specific areas of practice. While the inductive qualitative approach to this study has been useful in developing these propositions, a more focused deductive approach is recommended for future exploration of their validity and properties.

The change centered approach of this study is appropriate for future needs of the profession. Architecture appears to be on a path toward redefining itself as a more responsible and vital service to both individual clients and the community as a whole. This transformation will involve a greater reliance on scientific knowledge and a greater need for shared knowledge among colleagues. Further research into the process of change and learning among architects will greatly benefit this transformation.

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APPENDIX A

Interview Guide

A. Pre-interview information:

 ● Interview code number and date.

 ● Work place conditions: size of firm, image/style, organization, staff interaction, type of projects, use of computers, etc.

 ● Demographics: age, gender, level of education, career stage,

 ● Office role: primary duties (designer, project manager, production staff), areas of specialization

 ● Activities outside of the office: professional, civic, etc.

B. Interview Questions:

1. **What changes have you made or have occurred in your architectural practice within this past 12 months?**

 (Provide prompt sheet if subject cannot recall a change.)

2. **When did this change occur?**

3. **Why did this change come about?**

   a. What were your initial feelings concerning the change?

   b. Describe the sequence of events involved in this change.

c. How complex did the change seem to you at the beginning?

d. To what degree was the advantage of this change apparent at the beginning?

e. To what degree did you have an opportunity to observe the change in use before making it?

f. To what degree was the change compatible with related aspects of your practice at the time?

g. To what degree did you have the opportunity to try the change before applying it in practice?

4. Did you seek information or attempt to develop your skills in order to make this change or because of the change?

a. Describe the information or skills.

b. Did anyone help you gain this information or skill?

c. How much time (in hours) did you devote to acquiring this information or developing your skill?

d. In what order did you use these resources or take these actions to acquire the knowledge or skill?

e. Which of these resources was most important to you?

f. What problems did you encounter in acquiring this information or skill?

5. Did you use any formal educational programs while acquiring this information or skill?

(Provide learning prompt sheet if subject cannot recall.)

a. Please estimate the hours involved in this activity?

b. Which of these resources were of most value?

c. Were there resources that could have been useful but were not used? If yes, what prevented you from using them?

C. Post-Interview:

- Ask if the subjects has anything more to add.

- Ask if he or she would like a copy of the report.

- Make certain that the consent form has been signed.

APPENDIX B

Learning Prompt Sheet

<u>Learning Activities</u>

"Brown bag" seminars: lunch time and or informal in-house sessions

Sales presentations: informational presentation for specific product

Seminars: 1 to 3 hours, lectures, panels, demonstrations

Workshops: 3 or more hours with high level of involvement

Long term programs: courses at a college, vo tech, or other

Assessment tests or performance reviews:

Personally conducted research: readings, travel, observations, site visits, discussions with colleagues or other experts

<u>Resources for learning activities:</u>

In-house

Local AIA

National or regional AIA

Other professional association

Government agency

Manufacturer or producer

Architecture school

Other college or vocational school

For profit seminar provider

Libraries

Internet or other electronic media

APPENDIX C

Change Prompt sheet

Changes or innovations may be related to any of the following:

Programming

Project delivery

Design

Presentations/communications

Project management

Drawings and Documents

Specifications

Codes

Contract administration

New position or responsibility

Building types

Clients

Computers

Construction management

Office management

APPENDIX D

Consent form for individuals participating in research projects conducted by the University of Oklahoma - Norman Campus.

The Study: Patterns of Change and Learning in the Practices of Architects

Principal Investigator: Michael A. Price   University Advisor: Dr. Robert Fox

Dear Participant:

You are being asked to participate in a study of how architects make changes in their practices. This is an important study with national policy implications. As you are probably aware several states and the American Institute of Architects have recently implemented requirements for continuing education. The stated purposes of these policies are to insure that architects maintain competence and keep up with current issues. By and large these regulations have been adopted based upon assumptions about how changes in practice occur and the role education plays in that process. This study seeks to provide information of a more analytical nature in order to better inform future policy decisions. Its findings will also benefit individual architects and the building industry as a whole by increasing our knowledge of how innovations are introduced into practice.

Participation in this project will involve one in person interview of approximately 45 minutes in duration. You may also be briefly contacted by phone at a later date for clarification of your responses to questions asked during the interview. Your participation is purely voluntary, and you may at any time discontinue the interview or withdraw from the study.

Participation in the study should not pose any risk to you or your employer; nonetheless, all of the information gathered during the interview will be treated confidentially. Names of participants and specific details will be known only to the principal investigator, and no individual participant or his or her employer will be identified in notes or reports related to the study. At the beginning of the interview you will be asked for your permission to make an audio recording of the interview. This is optional and is only for the purpose of verifying the accuracy of the interview notes. The tape will be erased at the completion of the study.

Please indicate that you have reviewed the above statement and wish to continue your participation in the study by signing below. If you should have questions about the study or your rights as a participant, please contact Dr. Robert Fox, University of Oklahoma professor of education, at 325-2769.

_____   _____   _____   _____
Study Participant   Date   Principal Investigator   Date