Reconstructing Models of Studio Pedagogy in Response to Models of Emerging Professional Practice

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Introduction

Underlying assumptions for "problem-solving" design studio do not usually respond to changes in the professional practice at the pace these changes occur. This is due to the immense intellectual effort needed to re-examine objectively the deeply ingrained and recurring assumptions that are integral parts of a professional discipline. However, this inherent conservatism often prevents clarification of thought processes resulting from new evidence, which may render prevailing assumptions inadequate. Yet, such is the case as new knowledge necessitates the re-examining of models of education and models of practice. Upon examining continuity between these models, two significant observations emerge; first, a progressive practice model rests primarily on a strategic management infrastructure, which acknowledges the reality of symbiotic relationships among project development, design, and delivery processes; second prevalent education models display a disquieting inertia because of their reliance on behaviorist principles and cognitive theory to develop "creative" design talent.

These misaligned models exemplify the complex roots of current developments in the professional practice of architecture, where clients are becoming less interested in the means by which professionals achieve results - that is, the form that skills take - but are becoming results oriented. This is a significant departure from traditional professional business environments to which the practice had to respond in the past. Similarly, business perceptions regarding the extent of practice, scope of services, methods of project development and delivery have changed. Structural changes are taking place in providing architectural services that not only affect practitioners, but also profoundly implicate educators, and the organization of educational programs that are fundamental to entry and subsequent professional practice.

Because some discontinuity always existed between models of practice and models of education, the first few years of professional experience afforded new graduates opportunities to begin acquiring the practical skills and knowledge essential to continued progress in the profession. The current economic climate is reasonably stable and supportive of employers on-the-job train these new employees. However, the changing marketplace may not always provide a receptive climate for recent graduates seeking this form of on-the-job training. Such lag is evidenced by the reluctance of academia to fully adapt digital design studio despite the wide use of computers in professional practice (Yergens 1995). Incorporation of innovations in materials, construction technologies, and environmental systems is deficient in current education models (McKittrick in CRSS 1995). Therefore, these models of education must incorporate mechanisms responsive to current practice formats of providing professional services and changing market demands.

In order to incorporate these mechanisms, it is essential to study the impact of prevailing models of design education on the professional development of students and subsequently, the profession as a whole. Research should be directed towards formulating alternative models that can effectively prepare students and address change in professional practice. Relevant to these issues is the need to re-examine the assumptions underlying project-based, synthetic experience of the design studio, especially in the beginning courses of pre-professional study and foundation programs. Design pedagogy in these courses is the sole determinant of the most significant opportunities for students to acquire the skills and knowledge that constitute the foundation for continued growth in upper level courses. The realignment of education models with respect to anticipated market and industry trends, as well as the identification of skills and knowledge that correspond to current market demands are equally important.

Beginning courses serve as the gateways to the intellectual realm of the profession by broadening students' knowledge and cultivating their analytical and problem-solving skills. Because most students exhibit the highest degree of receptivity to new systems of thinking and intellectual growth potential, learning experiences in these courses are most likely to affect their functioning in subsequent courses and later professional life. Even the final design studio course, or thesis, which traditionally is most emphasized is frequently a more sophisticated integration of values and approaches to design problem-solving acquired in the beginning courses. It is a psychological axiom that experience shapes perception (Smith 1975). Relating this to professional development, experiences in beginning design courses constitute a vectorial beginning in the design profession. Attitudes developed in these design studios ultimately regulate perceptions of and reactions to practice situations and constraints.

Learning theory, explicitly or implicitly, has always been fundamental to design studio education models. It is generally believed that the psychology of learning affords teaching approaches richness, logic, rigor, and other highly regarded properties. It is likely, therefore, that design pedagogy will continue to incorporate approaches to problem-solving adopted from the

discipline of psychology. Since these approaches cannot assure predictable results and are likely to generate design problem-solving methodologies tailored to specific project parameters, a consideration of what they can and cannot be expected to accomplish is critical to the viability of the design studio experience.

An admittedly simplistic, but nonetheless helpful, brief examination and description of relevant behaviorist principles and cognitive theory, and the ways in which prevailing education models are predicated on these concepts reveal probable origins of discontinuity between these and emerging practice models.

Prevailing Education Models Based on Behaviorist Principles and Cognitive Theory

The assumption that problem-solving design model can be defined in terms of behaviorist principles and their corresponding design studio activities has its origin in Thorndike's experimental studies (1965). The solutions for design activities respond to project statements through rewarding and reinforcing changes in problem solving behavior. Associationism, as a methodological tool, is often incorporated into education models based on this assumption, whereby relating previously unrelated ideas and concepts is regarded as creative activity fundamental to the design process. However, what ideas and concepts are to be associated appears to be an important issue in polemics among practitioners and educators when addressing the social, technological, and even philosophical relevance of professional education to professional practice.

Of considerable concern is the emphasis on the trial-and-error process in the development of problem-solving methodologies as they are formulated for specific problems. These often result in a failure to provide the necessary conditions required for investigations of interactive aspects of project development, design, and delivery systems. Such methodologies, when learned, are likely to produce design approaches predicated on epistemologies exclusive of transdisciplinary concerns. How these methodologies are reinforced is further exemplified by one learning theorist's assertion, "that what has happened once will happen again, that an organism will tend to do what it has done most often in the past" (Skinner 1974). Thus, in the design studio, when a student is rewarded for a design solution, the recurrence of that specific problem-solving behavior is more likely to repeat when a similar design problem is encountered at a future time. The rewards, such as project grades, design jury comments, and the like, tend to be even greater when either one or both of two well-guarded approaches to design problem solutions are evident in students' presentations of completed projects. One is the "tools approach", which is reflected in the mastery of the graphic communication or computer animation of solutions. Because creative talent, often erroneously, is associated with elaborate and skillful presentation techniques, design solutions presented in such manner are likely to elicit obligatory reinforcement of problem-solving behaviors. The other is the "design parameters approach", which is focused on the simplification and systematic organization of programmatic input in order to optimize its manageability and applicability to definitions of performance criteria as these relate to project parameters, building structures and other similar determinants.

Learning design problem-solving in this manner is predicated on the performance of students' responses where consequences of their behaviors require either positive, or negative reinforcement. Because of intermittent differential reinforcements by educators, the students eventually develop hierarchies for the types of behaviors likely to gain them outcomes of perceived value. Ultimately these will serve as criteria for future responses to design problems. Similar behaviors in professional practice, however, rarely produce anticipated consequences because of relative, rather than absolute development and delivery processes involved in present-day projects, which do not facilitate varied applications of learned solutions to complex and changing design problems. Although one can extrapolate from the past into the future, knowledge acquired in such a manner is inherently limited to narrow fields of specializations within the profession where design problems are parametric, repetitive, constrained, and well-structured.

While behaviorist principles in design pedagogy provide a basis for the structuring of observable problem-solving activities, cognitive theory provides a framework for the translation of resulting phenomenological experiences into mental concepts by delving into "matters of inner elaboration of events" (Sullivan 1977). Kohler, whose experimentation was a keynote in the evolutionary development of cognitive theory, considered the problem solving process in a different way from behaviorists, associationists and functionalists. He saw it as a "restructuring of the perceptual field" (Marx and Hillix 1963). He maintained that problem-solving is a conscious process where insightful behavior is a consequence of the restructuring of a problem whose solution requires exploratory approaches. It follows, therefore, that the analytical examination of the components of a problem to be restructured is a pre-condition to insightful behavior. Kohler, however, did not elaborate on how to develop insightful behavior. As a result, education models, predicated on the theory of cognitive processes often reflected an individual educator's subjective interpretations. Such behaviors inevitably became associated with a so-called "hidden curriculum."

Benjamin Bloom, a theorist from the cognitive school, in his *Taxonomy of Educational Objectives* (1956), brought some clarity to Kohler's work in this area by providing material contribution toward the further development of methodologies in design pedagogy. Of particular relevance is Raugh's (1976) modifications of these concepts for use in evaluating exercises in architectural design against achievement-oriented performance criteria. His premise, as stated in *Beginning Design Courses at Schools of Architecture in Western Europe,* was that intellectual abilities and skills presume knowledge of logical constructs of various kinds, and that knowledge of these constructs presumes

an aggregation of factual knowledge leads one to the obvious inference of a sequential aspect to learning that graduates from the lower categories to the higher. If the cognitive activities that a student is asked to perform are charted over the duration of a complete course, a profile emerges that yields insights into structural organization of the course (1976).

Cognitive theorists have generally emphasized the development of methodologies that continuously improve upon problem-solving approaches. Ironically, various prevalent adaptations of these methods in design problem-solving activities in the studio are likely to reflect a linear approach within predetermined project parameters (Honikman 1974). Education models, therefore, exhibit a corresponding relationship to the traditional "design-bid-build" practice model, but with an emphasis on the "process approach." Such models sequentially adhere to the project phases of programming, design development, and construction documentation.

The product-oriented education models depend on the systematic integration of design problems whose solutions require "creative" thought processes cultivated by the "formal manipulation approach." Even more recent and elegant adaptations are founded on an infrastructure that has remained substantially unchanged since the 1910's, an era when design concepts were likely to be implemented as envisioned by clients. Scholarly and professional reviews of design education, as evidenced by the September, 1995 issue of *Progressive Architecture,* often express dissatisfaction with these education models, which may not determine, but strongly influence the structure of practice models. One observer of the practice of architecture, for example, perceives the culprit to be the "narrow definition of design that continues to be accepted by the profession and promoted to the client" (Dietsch 1993, 15). This point of view further implies that design studio activities structured according to these models of education foster rather unrealistic perceptions and expectations about professional practice. Central to these is "the idea of the 'creative genius', which remains a potent ideology in architectural myth-making and one, which has been identified with many problems that face architecture" (Wigglesworth 1993).

An examination of generally accepted design studio education models not only confirms their inadequacies, but also causes some anxiety about their immediate and long range impact on all design professions. For example, Balfour critically views traditional design studio problem-solving activities as merely "training" without intellectual discipline, or as "a personal indulgence" in which "knowledge comes not from an assimilation of external information, but wholly from an internal dialogue between the individual and his inner self" (Balfour 1981). When absorbed in these activities, it is likely that often "a student mistakes elaboration of analytic diagrams for a design solution" (Ledewitz 1985). Current trends in architect and client legal disputes confirm that many practicing professionals retain and nurture these erroneous practices and perceptions well into their careers. This is evidenced by a recent meeting between officials of federal agencies and representatives of private sector design professionals where issues concerning discrepancies between design solutions, and completed projects were discussed. The adequacy of the "design-bid-build" practice model was seriously challenged. The federal agency representatives contended that the quality of design has declined in recent years. They complained about plans that could not be implemented as drawn as well as defective or inadequate plans that gave rise to claims for delay damages and cost overruns. The architects responded with allegations that the federal agencies caused problems during the design process by making substantial changes in the scope of the project. Furthermore, it was their opinion that the client" would be better served if it would get out of the way and let them assume their proper role of producing plans and specifications that meet the agreed-upon scope and intended purpose of the project" (Lunch 1992).

Such cases exemplify consequences of thought processes fostered by design pedagogy that represents design problem-solving to students as a creative activity to be pursued in the realm of functional autonomy, i.e., engaging in the creative activity of design for its own sake, independent of the need which gave rise to it.

Implications of Emerging Practice Models for Transformative Education Models

The Transformative Education Model is an alternative mode, but still related model. It is based on structuring of viable learning experiences around a strategic management-contingent project development/design/delivery systems model. The reciprocal relationship between practice and teaching models is crucial to the effectiveness of design studio experiences in order for professional education to become and remain responsive to the fundamentals and dynamics of the building industry, in which architects are to become cogent participants. Although such transformative education models represent a departure from the traditional project-based, they provide a framework in which the students refine their abilities to optimize process-dependent solutions. The resulting experience will help architects to reason through unstructured problems confronting them in practice through optimizing design and technology.

Education models that incorporate practice models inherently generate methodological frameworks which simulate the management of control parameters for the development, design, and delivery of projects. They emphasize, therefore, the systematic evaluations of proposed alternative solutions to problems evolving from changing project conditions, and their potential outcomes. The emphasis on final products, represented by submissions of traditionally executed plans, sections, perspective renderings, and the like, is displaced by an emphasis on processes representing the consequences of strategic management decisions toward the achievement of defined project objectives.

Such design pedagogy mandates that design project statements be delineated in terms of dynamic sets of relationships whose

interactions and interdependencies create and control conditions that are supportive of specified design concepts. This integrative learning process emphasizes the improvement of judgments applied to often conflicting project priorities inherent in day to day professional practice. Gaming and simulation techniques, enhanced by the computer, as a descriptive tool, can further enrich decision-making activities and the learning of design problem-solving techniques.

Course contents, their structures, and types of projects will vary according to educational resources, collegiate philosophies, and individual educators' dispositions. The following components, however, are basic to any transdisciplinary design problem-solving studio activity organized around transformative models for design education which combine aspects of strategic management-contingent practice models and traditional "creative" design-contingent teaching models:

- 1 Definition of project objectives
  - -1 Analysis, appraisal, and structuring of information essential to delineation of programmatic parameters
  - -2 Interface client/user and project delivery team strategies
- 2 Formulation of strategies to achieve project objectives
  - -1 Development of design concepts that maximize the exploitation of opportunities and resources primarily utilizing existing fundamental strengths of participating entities
  - -2 Design development interfaced with pre-construction management and pre-procurement management
- 3 Evaluation of primary and alternative strategies
  - -1 Assessment of potential outcomes
  - -2 Suitability
  - -3 Feasibility
  - -4 Acceptability
  - -5 Value engineering to effect economy in the total life cycle cost of a project
- 4 Development of the community-based strategic management-contingent approach
  - -1 Project organization: what specialized personnel functions are required within what domains of responsibility, and on what decision making level?
  - -2 Actions required: what mechanisms are required to control project parameters throughout the delivery process?
  - -3 Cost parameters: what level of quality is commensurate with funding commitments?
  - -4 Schedule constraints: what time durations are required for specific tasks, their relations to others, and their intermediate and final completion dates?
  - -5 Quality parameters: what quality assurance during the pre-construction, and what quality control during the construction phases are required to ensure conformance with client needs and expectations?
  - -6 Critical review of results.
  - -7 Explicate presentation of a strategic management approach to the project and expected outcomes
  - -8 Evaluation of simulated consequences and courses of actions pursued during project development and delivery phases
  - -9 Guest critics to include: an architect with in-depth experience with given project type, a political/economist expert, a construction management specialist, and an experienced administrator of a similar previous project.

Conclusion

Professional and scholarly research confirm that the general direction of project development, design, and delivery processes has structurally changed. Although specific formats of business operations and types of projects vary, strategic management approaches are systematically implicated as the most viable means by which architects can more effectively carry out the development and delivery of their projects. Because architecture is inherently transactional not only in its social and physical contexts, but also within a larger building industry, its design and pedagogical approaches cannot be limited or reduced to analysis-synthesis models founded on assumptions unresponsive to the dynamics and fundamentals of the marketplace. Contextual factors that are reshaping the profession of architecture urge the acknowledgment of the need to develop transformative education models that can advance design pedagogy from the realm of studio "dialectics between pre-conceived solutions and observed facts" (Ledewitz 1985, 4). This advocates the creation of a realm of educational activities, where learning experiences are based on the assumption that design problem-solving is based on the aggregation of objectively derived facts that comprise the knowledge base for decision-making throughout the implementation of a design concept, and the strategic management of the complexity of interactions and interdependencies that permeate the building industry.

BIBLIOGRAPHY

Balfour, A. "Captive of Love and Ignorance: Architecture, Education and Practice." *Architecture Education Study*. Volume I. (1981).

Beinart, J. "Analysis of the Content of Design," *Architecture Education Study* Volume I. (1981): 3-157.

Bloom, Benjamin S. (ed.) *Taxonomy of Educational Objectives, Classification of Educational Goals; Handbook* I: *Cognitive Domain*. New York: David McKay Company, Inc. 1956.

CRSS. *Architectural education and the profession*. Houston, Texas: CRSS Center, Texas A & M University College of Architecture, 1995.

Dietsch, Deborah. "Design Envy," *Architecture* (March 15. 1993).

Honikman, Basil.. "Cognitive Structure and Design Method: An Initial Investigation," *Man-Environment Systems* 4 (1974):105-107.

Kohler, Wolfgang. *The Mentality of Apes*. New York: Humanities Press. 1951.

Langford, D. and S. Male. *Strategic Management in Construction*. Hants, England: Gower Publishing Company Limited. 1991.

Ledewitz, Stefani. "Models of Design in Studio Teaching," *Journal of*

Architectural Education 38 (Winter1985): 2-8.

Lunch, Milton F. 1992. "Designers, Federal Clients Debate Quality of A/E Services." *Building Design & Construction.* May: 29

Marx, Melvin and William Hillix. *Systems and Theories in Psychology*: New York: McGraw-Hill Book Company. 1963.

Raugh, R. and D. Wright. *Beginning Design Courses at Schools of Architecture in Western Europe.* Cambridge, Massachusetts: Architecture Research Office, Harvard Graduate School of Design. 1976.

Real Estate Research Corporation. *Emerging Trends in Real Estate.* Chicago, Illinois. 1992.

Skinner, B.F. *About Behaviorism.* New York: Vintage Books. 1974.

Smith, Adam. *Powers of Mind.* New York: Ballantine Books. 1975.

Sullivan, H. "The Interpersonal Theory: Sahakian," William S. (Ed.) *Psychology of Personality: Readings in Theory.* Boston: Houghton Mifflin Company. 1977.

Thorndike, Edward L. *Animal Intelligence: Experimental Studies.* New York: Hafner Publishing Company. 1965.

Yergens, Milton. *Reshaping Pedagogy in Architectural Education for the Information Age.* Masters of Architecture Thesis, University of Arizona, 1995.

Wigglesworth, Sarah. "The Crisis of Professionaization: British Architecture 1993," *Practices* 2 (Spring 1993).