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ABSTRACT

Studio teaching takes place in a tradition-rich, complex setting where teachers fill myriad roles with diverse students. In this paper, which was drawn from a larger research program, illustrative findings about three aspects of architecture studio teaching are analyzed from the perspective of the existing literature on teaching and teachers' viewpoints. The three topics examined are: (1) an aspect of students' thinking; (2) teachers' conceptions of their roles; and (3) a typical instructional decision. A studio curriculum that considers the developmental nature of students' thinking needs to be designed. Students' thoughts about alternatives to design problems need to be fostered throughout the program. Teachers' roles are defined by their expectations for students' work and their knowledge of the topic. Teachers are involved in complex thinking and in making decisions as they teach. Skilled teachers are able to effectively draw upon and orchestrate large bodies of knowledge using skills uniquely suitable for the problem at hand. Decisions about instructional methods must rest on teachers' assumptions about the purpose of studio learning and the nature of student thinking processes. The studio teachers' challenges and dilemmas are complex and rich and deserve illumination through research. (SM)

DILEMMAS IN ARCHITECTURE STUDIO INSTRUCTION:

RESEARCH AND THEORY ABOUT DESIGN TEACHING

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Abstract

The larger research program from which this paper is drawn examines studio instruction using a data base from observations in four varied schools of architecture. In this paper, illustrative findings about three aspects of architecture studio teaching are analyzed from the perspective of the existing literature on teaching and teachers' thinking. The three topics examined are (1) an aspect of students' thinking, (2) studio teachers' conceptions of their roles, and (3) a typical instructional decision. This discussion suggests certain implications for architecture studio teaching; the paper concludes by re-emphasizing the complexity of the teaching process and the importance of teachers' awareness of their own thinking and decision making.

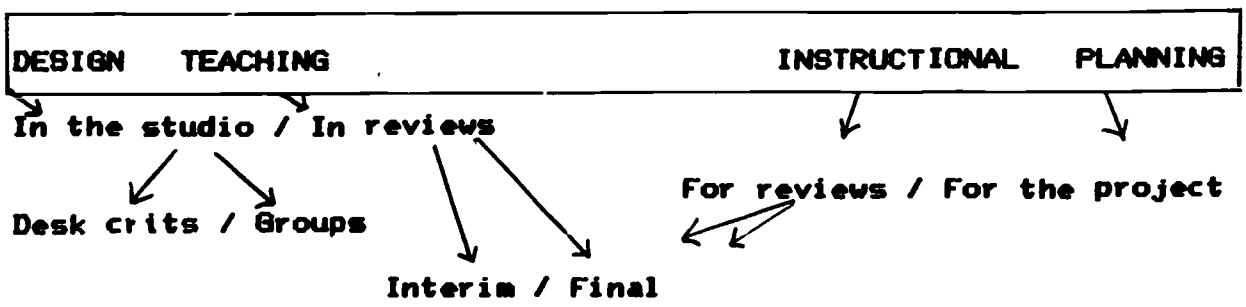
Introduction

The architecture school's design studios are among the most fascinating places on campus. Studio teaching takes place in a tradition-rich, complex setting where teachers fill myriad roles with diverse students; they address complicated issues that present them with intricate intellectual demands. Moreover, teaching in this setting often presents perplexing educational challenges. It is the extraordinary challenge of studio teaching that this paper seeks to address.

While the characterization of studio teaching as complex is not news to thoughtful architecture faculty members, what is rather astonishing is that the studio itself and more particularly the complexities of studio teaching have not been studied more energetically. Until recently, the only major systematic research on studio teaching was the landmark and woefully underappreciated Architecture Education Study done by the Consortium of East Coast Schools of Architecture in the 1970's (Porter & Kilbridge, 1978). Reasons for the paucity of research on architectural education in general and architectural studio teaching in particular have been explored elsewhere (Dinham, 1987a), but whatever the reasons, the time for rectifying these omissions is at hand.

In my own research program, underway since 1984, several aspects of architecture studio teaching have been or are being studied. Because we have found that no single research study could ever hope to reveal the complexities of studio teaching, we invented the "map" of studio teaching shown in Illustration I, and now are progressing through this domain by shining our spotlight on various areas of the unresearched territory. After conducting systematic observations in the undergraduate studios and reviews of four quite different architecture schools, I have written about juries in particular (Dinham, 1986), about how students' studio work is assessed in general (1987b), and about "board-to-board" teaching in desk crits (1987c). A colleague and I are also examining the nature of studio teachers' thinking as they design and teach the project assignments that form the core of the studio curriculum (Pinnegar & Dinham, 1987).

Illustration I: A Map of Studio Teaching



While these investigations have been promising, they are incomplete in two dimensions. First, we have not explicitly tied these studies to the extensive, pertinent research literature on teaching -- particularly the literature on teacher thinking. And second, this research's practical consequences for teachers have not been explicated. The present paper is a beginning at filling these two gaps. In this discussion, I describe three examples of practical aspects of architecture studio teaching, exploring their basis in the current literature on teaching and drawing recommendations for studio teachers to ponder.

Student Thinking

While some architecture teachers and jurors profess to be interested only in the final products of students' labors, most express their concern for students' thinking as well. George Anselevicius commented at a recent NCARB meeting that in education--the schools' real task--students should be "learning to think." Both in interviews ["I want students to learn how to think about a site"] and with students ["Now, think about that and I'll be back later"], teachers make it clear that thinking is important and learning to think should be among their students' goals.

The research on college students' thinking is extensive and the theoretical positions varied. One very interesting body of work on students' intellectual maturation suggests that through a well-designed educational program college students undergo a transformation from the simpler, dualistic thinking that they brought from high school, through stages of confusion about the multiplicity of perspectives in their fields to later, fuller understanding of their field's complexities and its consequences for their practice (Knefelkamp & Slepitza, 1976).

Another pertinent stream of research on students' thinking has been the work by cognitive psychologists through the last decade. The richer understanding of students' thinking that has come from research on students' aptitudes, students' information processing, and how students struggle to find meaning in new information/ideas (e.g. McKeachie, 1980) provides a base for analyzing students' thinking in the studio.

A third source of useful ideas about students' thinking has come very recently from research on design thinking. While thoughtful writings on design and design thinking have been appearing for many years, research on design thinking has been more recent (Akin, 1986). We would presume that as we learn more about the psychology of design we could make extrapolations to the educational psychology of design pedagogy. Only in the Architecture Education Study (Porter & Kilbridge, 1978) have we found extended discussion of how gifted teachers probe and guide students' design thinking. These promising directions await the attention of thoughtful, reflective design teachers eager to

bridge the theoretical design—education gap.

An interesting problem about students' thinking arose repeatedly in the data collection for my own present research. On several occasions I heard design teachers assign their students to "bring in next Wednesday" a set of alternate strategies for attacking a design problem. Usually the teacher asked for about three alternatives. Whether the problem was in a Level One (first design year, junior year of a 4-year program) exercise of limited scope or a Fifth Year (last year of a 5-year program) project of some complexity, students virtually all seemed to find it impossible to comply. Several students explained confidentially that the only way they could manage several alternatives was to develop their initial (and only) strategy fully and then either (1) quickly sketch some variations on that initial theme, or (2) quickly sketch something else—virtually anything else -- that might come to mind. One of these teachers described to me his concern that students fall too swiftly into single solutions and fail to fully explore alternatives. Not only does he want them to be more flexible in order to become better designers; he also realizes that they will need to produce alternatives when they work with clients who will want to consider several proposals. Moreover, he wants them to learn how to reflect on their own thinking about alternatives. The dilemma: how can students be urged to broaden their thinking? To recognize that developing and deciding among alternatives is critical to design thinking? How can students learn to think about their own thinking?

Part of the answer to this problem lies in the evidence on how students' thinking matures. Young students accustomed to seeking "the" single right answer often cannot imagine that there could be many (initially) equally acceptable approaches for a design problem, just as surely as an infant cannot imagine that a parent hiding unseen behind the door is really there. The difficulty is truly developmental, and the solution must necessarily be developmental. Unlike the infant, the student cannot simply "grow up," but a studio curriculum that takes account of maturational considerations can be designed. From the initial design course (or perhaps even the initial graphics course) onward, students' thinking about alternatives, and particularly the early production and parallel development of alternatives, can be fostered.

Part of the answer to this situation lies also in the fact that various teaching philosophies attach varying importance to the student's ability to specify an early parti, extend it, and follow it to its logical conclusion in a fully developed solution.

Another approach to this problem can be made from cognitive psychology. Norman, for example, speaks of learning as theory building (1980), observing that students will build theories of what is expected/acceptable whether teachers direct their

thinking or not; if this is the case, he points out, then teachers had best exercise some direction if they suspect students' perceptions could lead them astray. In the present instance, since students' maturational levels could indeed lead them to premature closure, teachers need to construct project assignments and follow through on their directives to prevent what students will naturally -- and not necessarily even lazily -- do. One way to provide that guidance, Norman goes on to suggest, is by providing prototypes about thinking, prototypes about how to think about alternatives, how to consciously broaden one's thinking and how to guard against constricted thinking. The most effective prototypes are often carefully crafted examples from the teacher's own experience: they give students examples of how teachers have themselves addressed the question of finding alternatives for solving complicated problems, and students can hear experienced professionals reflect on the nature of their own thinking.

Studio Teachers' Roles

To some extent ideas about teachers' proper roles are defined by those teachers' philosophical roots in the atalier or the workshop. But between these two extremes are lodged, of course, the variety of teacher roles we see in American architecture schools today. In my own research study are instructors for whom teaching consists of telling students what to do, others who wait until the student has erred badly and then point out the multitude of errors, teachers who focus on repairing students' work, others who will tell students only how they themselves would have approached the problem, teachers who join with students in playing out the design consequences of their ideas, and teachers who collaborate by helping students think through their thought processes.

Most teachers employ more than one of these approaches, depending on a host of intuitions and/or decisions about architectural design teaching, about the present project, about their own expectations for students' work, about the group's progress on the project, and/or about the individual student's progress and work. Two sources of current writings about teaching provide a backdrop for examining the studio teacher's role with students: the newest and ongoing work on teachers' thinking in general, and specific work on roles taken by teachers in professional fields.

The last twenty to forty years of thought about teaching have been dominated by behaviorist paradigms with limited application to the design studio. While advice to (for example) "state behavioral objectives for students' learning" and to "test students based on those objectives" may have been helpful in showing teachers that it is useful to be explicit about their expectations of students and to tie instruction and assessment of student work to those expectations, these approaches have fallen

short of capturing the rich complexity of teachers' thinking and decision making in their studio instruction.

More recently, those involved in research on elementary and secondary school teaching have moved to a focus on teacher and student thinking (e.g. Clark & Peterson, 1986; Wittrock, 1986; Doyle, 1986). In this fast-moving and exciting stream of research, some of the most important directions are inquiries into the nature of teacher thinking (e.g. Peterson, 1987; Yinger, 1987; Yinger, in press). For example, Peterson concludes that thoughtful teaching has -- in intellectural complexity -- much more in common with being a thoughtful physician or lawyer [or architect] than it has with being a technician. Moreover, teachers "plan for instruction in a rich variety of ways, and that these plans have real consequences" in their teaching. Teachers are involved in complex thinking, making decisions almost constantly as they teach. And teachers have "theories and belief systems that influence profoundly their perceptions, plans, and actions" as they teach (1987, p.8). This description, while intended to describe the public school teacher, applies forcefully to the Monday-Wednesday-Friday afternoon life of the effective studio teacher.

A second topic in this stream of current research is concern about teachers' knowledge of their topic -- in the present case studio teachers' knowledge of (experience with, reflectiveness about, and articulateness concerning) architectural design. This research proposes to us in architecture that it is clearly not enough to be a gifted designer. To be a gifted teacher of design one must not only be knowledgable about and able to "do" design, but also knowledgable about the specific strategies that enable one to design well, and the strategies by which one becomes a good designer; moreover, teachers need to know how to facilitate these ... strategies and processes on the part of the student" (Peterson, 1987, p. 13).

This research has also undertaken to define experienced, skillful teaching in a way that echoes definitions of other professions such as law, medicine, and architectural design. "One of the most important things psychologists are learning about skilled performance by experienced practitioners is that they are able to effectively draw upon and orchestrate large bodies of knowledge using skills uniquely suitable for the problems at hand....Attaining expertise seems to involve the mastery of a unique set of symbols and operations -- mastery of a language of practice (Yinger, in press, p.3). These ideas, developed from Christopher Alexander's writings about pattern language (Alexander, Ishikawa, & Silverstein, 1977) apply not only to our continuing efforts to define our goals for students' abilities in architectural design, but in the present discussion applies ideally to our thinking about the complexities of architectural studio teaching, where the teacher must "effectively draw upon and orchestrate large bodies of knowledge using skills uniquely suitable for the problems at hand" in the

rich and multifaceted environment of the school studio.

In sum, then, the role of the architecture studio teacher is illuminated as we examine and keep pace with the developing literature on the complexities of teacher thinking. This literature makes clear that the expert teacher's role is both intricate and demanding, and that we have barely begun to understand its depths.

An entirely separate stream of writing about teaching in professional fields provides another illustration of teaching's intricasies and demands. After its publication in 1983, Donald Schon's The Reflective Practitioner attracted the attention not only of scholars interested in defining and studying the character of professional practice, but also the scholars and administrators in America's colleges and universities concerned with preparing professionals. With Educating the Reflective Practitioner, Schon (1987a) explicated the educational approaches he proposes are essential in preparing professionals for a practice whose professional problems are characterized by uncertainty, instability, uniqueness and value conflict. For architects Schon's writings are particularly useful because he uses the architectural studio as an educational model for learning the artistry of practice, which he calls Reflection-in-action.

Since his 1987 book was published, Schon has gone on to define more carefully the kinds of teaching he sees in education for reflective practice (1987b). He concentrates in these discussions on the role of the "coach," the term he chose carefully to express the nature of teaching in the setting others have called the "professional apprenticeship" (Dinham & Stritter, 1986). Three tasks of coaching are proposed:

> First, the coach must deal with the substantive problems of the situation, drawing for the purpose on many domains of understanding; all these issues, together with the implications for the student's decisions, a coach may communicate not by academic analysis but by a kind of analysis-in-action.
>
> Second, coaches must tailor their understanding to the needs and potentials of a particular stage of develoment. S/he must give priority to some things and not to others. S/he must decide what to talk about and when and how to talk about it, deploying for this purpose the full repertoire of media and language at his/her disposal. S/he may give verbal advice or criticism, tell stories, raise questions, conduct demonstrations, or mark up the student's work.
>
> Third, the coach must do all these things within the framework of a role s/he chooses to play and a kind of relationship to be established with the student, taking

> account of the ever-present dangers of vulnerability and defensiveness, both his/hers and the student's (Paraphrased from Schon, 1987a, p. 176).

Schon proposes three models of coaching, all appropriate in particular kinds of professional education settings for particular needs. One model, called "Hall of Mirrors," is rather less applicable to undergraduate architecture studio teaching than to other settings because it focuses on how the student's learning about professional practice is mirrored in how the student and coach are themselves working together; it is, however, a powerful model for analyzing the kind of teaching that takes place in a psychiatric internship.

Two of Schon's models are exquisitely applicable to studio teaching, the models called "Joint Experimentation," in which the coach and student work together on the problem confronting the student, and "Follow Me!" in which the coach presents a particular kind of example from which the student gains in carefully planned ways:

> For joint experimentation to be appropriate and feasible, several conditions must be met. There must be a way of breaking the larger task into manageable instrumental problems. The student must be able to say what effects she would like to produce--must know what she wants, And finally, the coach must be willing to keep instructional goals within the bounds of the model. Joint experimentation can be used to help a student see possible ways of achieving a desired effect, introduce the idea of designing [a performance] through a series of local experiments, help to refine a student's perceptions of the qualities in her results. But joint experimentation is inappropriate when a coach wants to communicate a way of working, or a conception of performance, that goes beyond anything a student presently knows how to describe.
>
> "Follow me!" lends itself to just this circumstance. Its dominant pattern is demonstration and imitation; its underlying message is "Do as I am doing," whether communicated explicitly...or implicitly.... The invitation to imitate is also, in its way, an invitation to experiment; for in order to "follow," the student must construct in her own performance what she takes to be the essential features of the coach's demonstration (Schon, 1987a, 214-5).

The two streams of literature on teachers' conceptions of teaching present parallel but related streams of thinking about how studio teachers might think of their roles. Teachers' thinking, for example as described by Peterson and Yinger, occurs within the context of one or another conception of the "coaching" role. Expert teachers think, as Schon has implied, not only

about the topic they are teaching but also about the many layers of thought and the artistry of practice -- both the practice of architecture and the practice of teaching -- undergirding the teaching of the moment.

Instructional Dilemmas

Beyond the important but abstract concerns about teachers' roles and student thinking, studio teachers also confront tangible dilemmas about their instructional methods. Indeed, teachers have been described as "dilemma managers" (Lampert, 1985) a useful portrayal for the complexity of decisions confronting the studio teacher.

Clearly decisions about instructional methods must rest in teachers' assumptions about the purposes of studio learning, the nature of student thinking, role of the teacher in arranging circumstances so students will learn, the nature of the present learning to be accomplished, and how teachers can best foster that student learning. Instructional decisions occur in the context of these assumptions just as surely as the design of a building takes account of the proposed site. Should studio teachers ever lecture? Should residences have extended rooflines? It depends. Should studio teachers sketch over students' work, or leave it untouched? Should commercial buildings' architectural styles harmonize with those of nearby buildings, or make a statement by being different? It depends.

There are, of course, no context-free answers to questions about instructional technique. For the sake of example, consider the question of whether studio teaching can benefit from sessions in which the crit gathers the students and talks with (or to) them in a group for purposes other than the formal mid-project or final reviews. My research has shown a number of interesting differences among experienced, skillful studio instructors in how they teach in groups. When and how is an informal, unannounced review of 15 students' site analyses efficient and when does it waste time? When and how should students publicly critize each others' work? When students say they prefer desk crits to informal reviews, is it because they prefer privacy, or do they not feel they learn from the review of others' work? How do skillful instructors maximize students' learning from groups as well as from individual teaching?

There are no simple answers to these questions. No "how to teach" text will answer these questions. No single research study will provide a formula for answering such specific questions. The easy answer is that "it depends."

What "it" depends upon is the more interesting question. The answers for this more interesting question have been implied above, in reviews of the more abstract thinking currently underway in a variety of quarters. "It" depends on teachers'

philosophical conceptions of their roles, and on teachers' and students' thinking. It depends on the teacher's intentions and assessment of what the students need and can accommodate at a particular time. It depends on whether and how her expectations are communicated to students. It depends on whether there is useful information that pertains equally importantly to all students. It depends on whether the students are tired and anxious or eager and inquiring. It depends on whether the teacher is able to elicit and articulate instructive value in the work being discussed. It depends on whether students can understand what he is saying. It depends, in sum, on the teacher's conception of her role, on her careful and accurate analysis of the teaching moment, its context, and its goals; on the teacher's design of his instruction to meet those specifications; on the match of teacher thinking with student thinking.

Comment

The complexities of architectural studio teaching, the dilemma management, the orchestration of thought and skill both of design and of teaching -- these are the stuff of our current research on studio teaching. In these few examples I have alluded to the wealth of current research on teaching and its implications for analyzing and understanding studio teaching. That the architectural studio is an immensely complex and rich environment is clear to any studio teacher. It is our assertion not only that the teacher's challenges and dilemmas are immensely complex and rich but also that they deserve illumination and celebration.

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