# BASIC DESIGN: THE CHALLENGE
## PROCEEDINGS FROM THE 5TH NATIONAL CONFERENCE ON THE BEGINNING DESIGN STUDENT

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APRIL 8 & 9, 1988
Learning visual linguistics comes most easily through an on-hands manipulation and analysis of the vocabulary of design, i.e., point, line, shape, form, color, texture and light. In beginning architectural design the construed meaning of these more general elements can transfer easily in concept to the more specific architectural connotations of column, beam, wall, form, etc. Well formulated, open ended exercises exploring the visual vocabularies, introduce the student of design to the language system, albeit visual system, that will become their mode of communication in their life’s work. Often, design activity, which explores the basic elements of design is talked about in terms of being abstract. In fact, this work in visual linguistics is the experimentation and discovery of a very real and concrete system of communication which happens to be visual, rather than verbal. For the design professional, this language is no less important than one’s own written and verbal communicative skills. It is through visual linguistics that architects and designers the world over communicate, without barrier. It is essential that this language is taught first in the sequence of a student’s design education in order that they can acquire necessary skills in the most basic necessity for them, the visual language.

A series of exercises have been designed which provide the beginning student of design with a basic understanding of visual terms and methodologies. It is our obligation, as design educators, to provide the students with that basic visual knowledge in order to allow him/her the most basic conversational tools. Very often programs of architecture, which are based in scientific and non-visual methodologies, forgoe the education of vision in lieu of substitute technical, analytical and/or rational processes. This attitude omits the recognition that geometry is the primary intellectual fabric of architectural thought, providing a substantive basis for all other theoretical conception, and that the event of making architecture is a visual exercise and that the event of making architecture is a visual exercise. Is it any wonder that in the late twentieth century, oftentimes we hear third of fourth year architecture professors from programs based in scientific modes, complaining of the students inadequacy in generating concepts related to form and space, except in naive ways? In order to provide the basis for other theories of design, whether those be historicist, rationalist, modernist, scientific or deconstructivist, a basic course of fundamental study in rational and fractal properties of geometry as applied to design is essential, starting with the most pure and simple of shapes, the square, the triangle and the circle and building up an understanding through visual exercise. Paraphrasing Hegel’s thoughts, Picasso said of visual learning “..they can know only what they already know. So how do you go about teaching them something new? By mixing what they know with what they don’t know. Then they see vaguely in the fog something they recognize, they think, ‘Ah, I know that.” And then its just one more step to "Ah, I know the whole thing.” And their mind thrusts forward into the
unknown and they begin to recognize what they didn't know before and they increase their powers of understanding." (Huffmgton, 1988, p.110)

Having observed new students perform visual tasks for some twenty years, it is still fascinating and exciting to see the varying degrees of complexity and diversity that can be achieved in a relatively short period of time. Leaving projects open ended and relatively non-restrictive at first provides the student with a canvas for action on which to develop their imagination. Motivation may become a difficult factor in that students at times find it difficult to enter a world in which they are not familiar and the visual world is often very unfamiliar territory for the student of design. Nonetheless, if the educator approaches the beginning studio with a sense of acceptance and openendedness, the creative juices flow freely and the students learn first to think openly and freely on these overwhelmingly important issues.

The study of simple visual geometric principles can set the foundation for creative activity in first exercises oriented toward the beginning design students. As mentioned earlier, it is truly an understanding of visual geometries that provide the foundation for ordering in the design fields and the establishment of order should be one of our principle goals. Types of order are myriad in nature. There are rigid interpretations based in Bauhausian and Beaux Arts methodologies, that provide geometric interpretations on definitive vertical, horizontal grid patterns and spatial organizations. There are more recent developments in design thinking that provide much more complex bases founded in fractal geometry and concepts of chaos. At the early stage of a students experience, in the first semester, it is my contention that there is so much to be learned in solely learning the vocabularies of visual linguistics that the student should be set free to interpret at will. The overriding factor that must be maintained at this level is the production of a creative thinker, one who can make visual manipulations and work with visual entities in creative ways. For the teacher who fears too much diversity, may I also offer a word of caution. Too restrictive an experience in early visual learning will, I believe, offer the student a highly limited experience from which to draw from and produce a certain level of fear in the individual's ability to proceed with confidence. It is my contention that one should work at the beginning level from the more open and general then to the specific. Open ended frameworks for creative action slowly are replaced by more closed interpretations with greater sets of rules and regulations as one progresses through the creative experience. The sequence of projects in basic visual studies should contain a progression of exercises that feed one into the other. In the language of vision, point makes line, line defines shape, shape then defines form and then color, texture and light help us to perceive the qualities of the other elements. This is a natural progression that can easily be maintained in the sequence of offered studio experiences. Some call these visual exercise 'abstract' in fact they are abstractions but of a very real language. For the purposes of this essay, I would like to concentrate on the education of the basic elements of point, line, shape and form.
Point\Line

Teaching point and line configurations can be handled in many interesting ways, but I do think it is essential to present the student with exercises that are both two and three dimensional. One can work with many different media in this regard, ranging from the technical pen used on illustration board or vellum to the use of balsa wood and wire elements and spheres in space. Exploring three dimensional spatial volumes with point and line can be extremely interesting, asking the student to define a visual structure within the confines of a given space using these elements, exploring that 'structure' with the visual entities of point and line. Other factors should enter into the discussion about the placement of elements in space, such as the more intuitive and analytical properties that give qualities to the design such as dynamics, statics, balance, etc.

Shape

Teaching figure\ground studies further explores the realm of geometric principle in that it is the students initiation to the manipulation and intelligent placement of shape. The figure\ground studies (2d, black on white and vice versa) should be those which are centered around the creative manipulation of shape with other shape and their subsequent interrelationships. The explanation of such an endeavor occurs similarly to the type of discourse which would take place in a language course regarding sentence syntax and structure. The difference is that rather than restrictive initial rules which are resolved through rational and established means, producing correct answers which pre-exist, the creative process would allow for a different perception of teaching in that there may be many absolutely correct answers that become new models to be either followed or extrapolated from. Shapes can make a visual, geometric language that can be discussed interpretively as well as creatively.

Initiating the student to shape manipulation, comes first with the explanation of pure shape, the square, the circle, the equilateral triangle. Shapes can be added to shapes. Portions of shapes can be subtracted from other shapes in order to formulate new shapes. The intersection of two shapes can evolve entirely new shapes. All shapes, whether original and pure or newly concocted, can enter into the creative game depending on the formulative rules. One can then interact these shapes with each other and the given background in order to formulate relationships of shapes to shapes on two dimensional surfaces. The resultant design will also have the very deliberate properties of various types of chosen organization, based in two dimensional grid structures, juxtaposed grid systems, etc. The student is then discovering and defining rules as one plays the game. This activity constantly reinforces the students confidence in design making or visual activity. Even when the results are not sophisticated, the process

After learning about the interactive properties of shapes with other shapes, the second phase of the problem is then the eventual organizational possibilities in a two dimensional field. The design and architectural implications are clear in that the shapes may represent spaces or voids as they do when concocting an architectural plan or elevation. Structural conception is also fostered subliminally in this manner through the patterning of elements. If the
teacher is non-restrictive and willing to look at and develop with the student all intuitive and methodological approaches the students may take, the possibilities will be endless and the ability to perceive, many different types of organization will occur. Proportioning systems such as the golden mean should also be discussed at this point, opening the world of possibility for the student. The teachers goal in this teaching system is to open the doors freely and then work individually with students to develop their choice systems. The critique at the end of the exercise becomes a critical educational tool where he comparison and explanation of all the different choices made by the student occurs.

Form

The principles applied to the two dimensional shape studies are next in sequence applied to three dimensional form studies. In order to intellectually connect the two dimensional visual concepts to the three dimensional, the next progressive step would be to move slowly from the two dimensional plane into the three by using low relief studies of form. Say, for example, if the earlier formats of the exercises was a 12" by 12" board then this exercise would move some 2 and 1/2" off the board at maximum. The eventual project would also be hung on the wall as the two dimensional project has been.

Interaction of forms with other forms can occur as it has with the interaction of shape with other shape. The forms can be added to each other to make larger and different forms. Portions of forms can be subtracted from other forms to create new forms, the intersections of forms can create new forms. In addition planar elements can also be created from this process. It is encouraged that the student begin with smaller pure forms, a 1" by 1" cube, a 1" tetrahedron, a sphere. (the sphere can be most difficult and frustrating for this experience and at this stage of visual development and is not encouraged) Once the student has worked within the geometric properties of the relationship of form, the student is then asked to order the experience within a given field of three dimensional action. Like the two dimensional project rigid subliminal grid structures may be developed or more random ordering of form elements may occur. In either case quite exciting examples will be developed. The scale is an issue in that the geometric principles discussed, addition, subtraction and intersection lead to a personal choice as to the size of elements and voids in the composition. The exercise should be initially completed white on white so that shadows appear and form is clearly accentuated. Other interpretations in color may take place as secondary studies.

The next phase in the sequence is to then interpret form in a full volumetric study, concentrating on form, plane, line (column), and space in the overall composition. If the two dimensional study has been executed in a 12" by 12" format then it is logical and desired to contain this exercise within a volume that measures 12" by 12" by 12" high. The idea would be now to take all principles exposed in the visual language to this point and to utilize them within this volume of space, expressing the full volume of space and dividing the full volume of space in either rational formats or extrapolated fractal formats. In addition the more intuitive occurrences of balance and dynamics will be developed. A full formal study then sets the tone for a future step into architectural conception. The student is encouraged to
again complete the exercise in white only so that the nuances of form can be depicted through the subsequent shadows and play of light. Color interpretation can be excellent extrapolations of the initial idea, set within guidelines. At all times the most precise of craftsmanship should be encouraged and expected in order to reinforce the precision aspects of design in the built environment.

Having experienced this process the student of design is learning to experience visual entities and elements within set parameters of space. This is an elemental definition of their intended professional activity and sets in order the overall educational concept that one will be dealing with column, plane, form, space and light within certain given spatial limitations—a very basic conception of architectural activity. The student who performs this sequence of basic design projects is exploring the language of form and space without the confines of architectural constriction. The third face of basic education in design would then introduce the student to architectural problems by the addition of human scale and behavior within simple functional parameters. This would be executed after the second phase of basic design development which would explore the values of texture and color, the qualitative factors which add a rich dimension to the study of line, plane and form.

Reference: Huffington, Arianna Stassinopoulos; Picasso Creator and Destroyer; Avon Books, New York, NY, 1988
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National Conference on the Beginning Design Student (5th; 1985, Albuquerque)
Teaching Beginning Students: And Now for Something Entirely Different

by

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This paper contains some observations and commentary about the pedagogies, past and present, involved in the teaching of design to beginning students. There will be no beacons lit here, but it is hoped that some paths and issues will be illuminated that will prove useful in defining the direction that beginning students may take.

Before continuing, it should be noted that the term post-modern was problematic for the author. Post-modern is used by some to describe a whole movement of thought and work that was supposed to be divergent from the flawed ideas of the modern movement (another problematic term.) However, some scholars, artists, and architects came to view post-modernism's social and political agenda as defective and rejected that label as a representation of their efforts. The author has observed, perhaps not accurately, that other terms such as deconstruction and especially post structural seem to be favored by some of those who believe themselves to be at the cutting edge of the current philosophical turmoil. "Re:Post", an essay by Hal Foster which attempts to separate these epistemological categories will be quoted later in this paper.1 For the sake of his own confusion and that of the readers, the author has stuck to the term post-modern as a general one to cover the broad movement of philosophical positions. He has tried, at times, to use the terms post-structural and deconstructural to point to a shift in philosophical ground. It is hoped that this leaping about will not be too confusing to the reader.

In the early part of this century, the Bauhaus, an art and design school located in Weimar, Germany, lead by architect Walter Gropius, developed the first modern beginning course of study for design. This foundation program, often titled "Basic Design" spread the Bauhaus influence worldwide in schools of art, design and architecture.

Richard Hamilton, the British artist and design teacher, points to the pedagogical objectives that these courses hoped to achieve:

... the development of practical disciplines which will promote orderly and logical modes of thought - the ability to analyse action already taken, to make deductions about a future course of action and to draw conclusions from the final product which will project a further series of self-directed acts. Secondly, it provides given knowledge, established facts about the state of the world, the existing theories and methods, tools and techniques by which evidence of thoughtful action is fabricated. 2

Professors Grebner and Bermudez, in their excellent and useful study of basic design courses, point to the philosophical controversy that design educators are facing in trying to devise a course of study for beginning design students:

At issue was the stereotypical as well as pejorative meaning that Basic Design aroused in certain people, as a course devoted to pure design issues lacking elemental environmental concerns (behavioral, social, etc.), and therefore associated with Modernism. 3
Has the stereotypical (Bauhaus) design course reached entropy? Has modernism come to closure? Apparently. In replacing architectural modernism, the postmodern movement was recognized to open and extend the field of inquiry for the possibilities of design and design education. In philosophy, literature, art, architectural theory and criticism, post-modern (post-structural) thought still has currency; but the post-modernism of architecture is in trouble.

In the New York Times article, "Where is Architecture Headed?", Paul Goldberger quotes Peter Pran, former co-chairman of the Awards Committee of the New York Chapter AIA:

Modernism lasted 80 years before it was severely attacked, but post-modernism has only lasted eight years. ... At New York City architecture schools, 99 percent of the students are designing modernist buildings; the interest in Michael Graves, Philip Johnson, etc., is completely gone there. 4

Goldberger goes on to observe:

... students are moving back toward modernism. ... They fear that post-modernism's love of visual pleasure has made it suspiciously close to decoration, not architecture. They suspect that there is something deeper in architecture, and they are demanding it. 5

Goldberger has not come to bury post-modernism in the Times article. On the contrary, he feels those who would declare post-modernism dead are as "naive" as the folks who had previously declared modernism defunct. He believes that these two contrasting philosophies are evolving. Post-modernism is becoming "more rigorous," while maintaining the "priority of emotional comfort." Modernism's young no longer hold that they are "going to change the world;" they have turned "inward" in a "quest for pure form." 6 If we accept Mr. Goldberger's premises (and there would be good arguments not to do so) regarding the philosophical state of architecture today and the current architecture students' philosophical choices, we might ask -- should or shouldn't beginning students and their teachers be affected by these developments? If they are affected, how do they respond to this philosophical climate?

Driven by technological, social and economic factors, the profession of architecture is being redefined. Students can no longer be trained for the stable well defined position of architect. But there are still basic visual skills and processes, now enhanced by technologies, that can be identified as essential to the study of architecture.

At issue for beginning design students is the deconstructuralist (post-structural, post-modern) approach based on literary theory, which is so often employed as the impetus for generating design in opposition to the stereotypical Bauhaus influenced courses that supported modernist aspirations and methodologies. In its search for the original, modernism sought objective truth through the reductionist means of separating value judgement from literary interpretation.

On May 26, 1904, Paul Cezanne wrote to Emile Bernard, "(the artist) must beware of the literary spirit which so often causes painting to deviate from its true path -- the concrete study of nature -- to lose itself all too long in..."
intangible speculations." 7 Nature could be analyzed and reduced to the basic components of "the cylinder, the sphere, the cone." 8 Eventually bolstered by the scientific method of investigation, this geometrized pallet served as the basis for design courses to explore visual sensation. As modernism and its educational concepts wore on, its ideas, its functions, and its goals began to be questioned. Today's scholars allege that modernism's avant-garde failed to really develop social and political interaction with the everyday lives of people. One could not sensate moral and political values. The public that modernism addressed became narrower and more specialized. 9 Its audience - artists, art critics, dilettantes - the supposed proponents of liberal humanism, had little real impact or concern for the general public. The artist/architect became its own subject; the objectifier became the object; entropy ensued.

Basic design courses paralleled modernism's avant-garde quest for novelty and the exhaustion and eventual decline of this method. The application of principles that analyzed the inherent nature of materials in relationship to their pure visual function was a tenant of basic design courses. The presentation of these abstract problems had little direct involvement with traditional (historic) styles or social and environmental concerns. In part, over the decades basic design has gone through a process of atrophy due to its inability to properly address these concerns. Ironically, problems that once addressed the phenomenon of seeing became a vehicle for the production of dull and lifeless objects. Endlessly regurgitated, the supposed attributes of classic basic design problems of the Bauhaus were codified. As teachers' dialogue became more rigid and their expectations increasingly narrow, a rote list of desired features to be seen in the final projects were distributed for the students' easy and quick consumption. The initial purpose -- the process of penetrating the abstract nature of order as a means to define one's condition in the world -- was lost. What replaced this means of perceiving the world was the contrived preconceived response -- mindlessly predictable. The Bauhaus and later IIT teacher, Walter Peterhan's problem, the "gray square", explored the comprehension of the equivocal nature of space and precision, degenerated into tasteful, if not somewhat arbitrary, arrangement of a somewhat irrelevant, gray square on a white (but not always) plane. Armin Hoffman's problem given in Basel at the Kunstgewerbeschule, "transposition of an object" where the tensions between abstraction and representation were confronted, descended all too often to illustrations of cutely rendered fruit or machine parts. The object and and the act of getting it superceded the content -- the philosophy.

Feminism, Marxist theory, deconstructionism or post-structuralism, and a dubious blending of all checked into the vacant room left when "liberal humanism" checked out. 10 These theories have either consciously or unconsciously played a part in the teaching of beginning design. But the question remains: who is leading the inquiry -- the professor?

As mentioned previously, post-modernism hoped to extend the field of inquiry. In doing this the critic is allowed a more potent role. Roland Barthes's essay, S/Z, the analysis of Balzac's "Sarrasine," goes beyond the traditional role of literary critique. His criticism becomes a thing unto itself; criticism becomes itself a piece of literature. 11 Deconstructionism's philosopher, Jacques Derrida, analyzes Cezanne's statement "I owe you the truth in painting and I will tell it to you." (to Emil Bernard, October 23, 1905), by
layering meaning on meaning thereby expanding the possibilities of the statement's relationships; its language becomes an object of endless meanings. 12

Architecture and art critics/theorists are attempting to recast the issues in architecture and art in the same manner. Between the sign and the signifier comes desire and design; architecture and art aspire to literature.

As mentioned in the beginning of this paper, just as in the term modernism, post-modernism is an inadequate label. It does not differentiate among all nuances of philosophical or even stylistic positions. Charles Moore, identified as a post-modern architect addressing the 76th ACSA Annual Meeting in Miami Florida, referred to "an architecture based on fading literary fad." 13  Hold on! We all think that is a post-modern theory and Moore a post-modern architect. The confusion over where one theoretical zone begins and another ends may be yet another indication of those who are dissatisfied with what has been identified as representative of post-modern work. Like the students in Goldberger's Times article, "They suspect that there is something deeper . . ." 14  Hal Foster's essay "Re:Post", deals with post-modernism as a concept in conflict. He states, "... the rejection of post-modernism on the grounds that its elements are to be found in modernism may be countered with the argument that they now exist in a new order, transformed in place and effectivity. 15

The architecture of Moore and Robert Stern does not represent the social, economic and political agenda that the post-structuralists envisioned for society; that is to take art and architecture back from the material class. For them the post-modern style was co-opted by the power elite and trivialized. The post-modern architecture of Moore and Stern is an extension of the strategies and values of modernism.

Goldberger's case for a return to a less idealist and more down to earth modernism, or a post-modernism that has cleaned up its act, may not be accurate or desirable. To create an ad hoc strategy by adding on to the ideas of modernism the expanded awareness of post-modernism, or making post-modernism more rigorous does disservice to both approaches. Serious architects and thoughtful students are developing the central issues in design in spite of how these issues are characterized. They are trying to move design out of the fashionable into a tougher and more comprehensive stance.

Previously, this paper addressed the shortcomings of Bauhaus inspired design courses. But what about the courses that have attempted to replace the Bauhaus type? Basic design courses responded to the issues brought about by post-modernism by either ceasing to exist or changing their curricula to accommodate post-modernism's concerns. The problems developed to engender post-modernist learning often suffered the same superficiality that characterized the modernist approach. Problem-centered social issues expressed by visual means often leave the students neither dealing with visual or social aspects of the problem. Both topics are very complex by themselves and deserve serious consideration and study beyond the time limits and staff capabilities found in these courses. Do the students have the background to develop a deeper penetration of the issues that surround disparate social conditions? If they do not, the solutions to this problem run the danger of becoming cynical objects, neither addressing properly the issues of contemporary society or the exactness of visual communication.

Memory, personal and mass cultural, serves as a basis for another beginning design problem. The students make models of a certain geographic
location envisioned through space and time, from the cave to the post-modern apartment block. The obvious benefits of this problem are that students are encouraged to make connections with their existence in the context of civilization and the continuum of history. It is a complex task, however, prone to literal interpretations that would sever the thread of the meaning, impact and poetry of memory, leaving behind only a prosaic object.

The Bauhaus inspired basic design proceeded to inform the student by teaching from the general condition to the specific. Bauhaus type courses attempted to induce the unique, the new, by suppressing historic examples that the students could emulate. Inspiration would flow from within the student as he engaged a program of search. Today, by contrast, many design teachers are encouraging students to develop historic precedents, "image banks." The Ecole de Beaux-Arts architectural teaching is used by some as an example of skill development, coupled with the understanding of historic precedent where the master sets the example for the apprentice and the student develops specific knowledge applied to the general. Here, the cult of the new is vanquished, or do we have old wine in new skins?

This alternative to the instruction of modernism addresses specific, real problems: architecture, real history, etc. and not the vague abstractions of modernism. But this alternative beginning design course possesses its own very real difficulties. Preconceptions stemming from the concentration on specifics readily lend themselves through categorization to becoming teaching formulas. Too often the problem starts with the specific and gets narrower rather than expanding to more general principles. The need to show the two or three ways to solve the problem tend to inhibit inquiry by setting superficial goals. This course of study induces the same stereotypical results that it hoped to avoid in modernist design courses. For in reality, the students in Bauhaus type design courses ended up copying examples, though seldom admitting it. Their rote and preconceived answers were the products of teaching formulas. Care must be used in examining preconceptions or in displaying examples. For instead of clarifying design issues, the preconception or the finished examples represent the limit, a dead end. Better to sacrifice the supposed clarity in order to encourage the student's confrontation with the abstract issues of design and human endeavor.

As the Grebner-Bermudez study states, most of the beginning students are ill-prepared to undertake the visual activity required to fully participate in architectural studies. Furthermore, most beginning students lack a sufficient liberal education that would prepare them to deal with life's abstractions. Allen Bloom's The Closing of the American Mind is one in a recent spate of books decrying the dismal state of American education. Although Mr. Bloom tends to be elitist and ultra conservative, he does underline the lack of America's young to deal with the basic educational tools that would enable them to cut through the abstractions of life. For him unless there is a change in the educational philosophy in this country, the young are doomed to live life on the surface like flies on a window pane. While basic design does not substitute for the much needed liberal education, it can provide connection with our visual environment, past and present.

Basic design, beginning design, or foundation design (or whatever it is termed) is struggling with doubt as to its own identity and its own existence. This activity is necessary and will ensure its survival as a discipline and prevent it from declining to the mere means for the production of simplistic objects. When too much importance is attached to the objects produced by the
students in design courses, the consequence is that the ideas generating order begin to suffer neglect. In a sense, the objects, things, or even the problems, have little meaning in and of themselves. They only represent the process of ideation. It is through that process that we make the vital connection with culture.

In engaging in the examination of the meaning of order, beginning design can aid the student in penetrating the abstractions of life and liberate him from the literal, allowing that intangible quality -- the creative impulse and sensibility -- to be nurtured through our studies.

The practice of architecture is being redefined. Today, the concentration on research and intellectual exploration will challenge faculties that have come from and place emphasis on the practice of architecture. The pressure is on -- architectural schools must evolve by placing stress on the intellectual fundamentals and the ability to adapt. Basic design can provide the initial structure for understanding the process of analysis and synthesis that is integral to change.


3 Dennis Gebner and Julio Bermudez, "Beginning Design in ACSA Schools, Paper and Survey Summary", (Minneapolis: School of Architecture and Landscape Architecture, University of Minnesota-Minneapolis, Spring 1987) 3.


5 Goldberger 56

6 Goldberger 54, 56, 57


8 Cezanne to Emil Bernard, April 15, 1904. Fox 13.

9 Howard N. Fox, Avant Garde in the Eighties, (Los Angeles: Los Angeles County Museum of Art 1987) 16-20. In this and subsequent paragraph the author has relied on Howard N. Fox's excellent analysis.

10 Alan Wallach, "Assessing the Marxist Tradition", College Art Association of America 76th Annual Meeting, February 1988. Here I use Prof. Wallach's observations to show that these movements are now trying to deal with questions that modernism did not totally resolve. Professor Wallach, in his presentation, asserts that academic marxism must assert its independent identity in order not to be weakened by attempts to merge it with other recent academic "isms."


14 Goldberger 56

16 Mark Gelernter, "Teaching Design Innovation Through Design Tradition" paper presented at the session "Purging Design Education of the Tabula Rasa", 76th Annual ACSA Meeting, Miami, Florida, March, 1988. Exploring Prof. Gelernter's ideas for the next two paragraphs, the author forms a critical view of his proposed teaching strategy. In this paper Prof. Gelernter points out that the method of modernist beginning design instruction began from the general to the specific and that this practice is counter to accepted educational theory -- that children learn from the specific to the general. He goes on to state that preconception as shown in the apprentice-master relationship, i.e., Ecole des Beaux-Arts, where pre-existing models were used to instruct students about design could serve as means to instruct today's students about design if presented in the right way as a stimulus to growth. Even Bauhaus type courses showed examples, Prof. Gelernter points out. In the body of this paper the author tries to show where he is in disagreement with Gelernter's position.

17 Bermudez Grebner, "Beginning Design in ACSA Schools" "Proposal for an Introductory Design Curriculum (Basic Design)", School of Architecture and Landscape Architecture, University of Minnesota-Minneapolis, Spring 1987, 1.


19 William J. Mitchell, letter to University of Utah staff commenting on the direction architectural education will take, February 1988.

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BASIC DESIGN OR BASICS OF DESIGN?

Questions concerning the role of Basic Design study in architectural education.

by

Alexander Maller

Key Words: Basic Design, Principles of Design, Architecture

"Design, like Science, is a way of looking at the world and imposing structure upon it."

Bruce Archer, (1)

"Design conceives and defines all means we employ to satisfy our many and increasingly intricate needs. It covers our cities, factories, hospitals, schools and houses, together with all those products we use within them."

W. H. Mayall, (2)

"the mass of ordinary people blame architects for everything they see around them... Architects design for other architects, not for tenants."

From Prince Charles' speech to the R.I.B.A. 150th Anniversary Gala, June 1984, quoted by J. A. Powell (3)

"Everyone who designs devises a course of action aimed at changing existing situations into preferred ones.... Design, so constructed is the core of all professional training: It is the principal mark that distinguishes the professions from the sciences."


Recent years have witnessed the establishment of design as a recognized discipline in academic and professional terms. However, because of this very recognition, the question, for whom design in general and architectural design in particular is aimed, is being raised with evergrowing insistence. Are we designing "for people or for ball-bearings" to formulate the question in Jonathan Simel's poignant style (4).
It is not the intent of this paper to discuss this specific question, but to attempt to clarify why the question is asked.

When badly needed, low income housing schemes are blasted because of extremely dangerous misuses they generated; popular or royal criticism cannot be dismissed anymore as ignorant or committed to exclusive taste. Something evidently went wrong.

It is difficult to determine who is to be made responsible for these failures: educators or practitioners, promoters or theoreticians. It seems that all share some responsibility and therefore we, in our role as educators have to look into our own activity field and try to identify causes for this dangerous situation.

In this context, the question we may ask is, which study field is best suitable to train architectural students into the critical penetration of the vast theoretical information available to them. Consequently, we may ask also, in what way this study should be structured in order to allow for a better human awareness in design. In order to promote a structure for the study of basics of designing a review of goals may be helpful. Siegfried Maser points out the following educational goals for Basic Design:

"The architecture student must seek his design personality within the polarity of theoretical and practical research into the basic rules of design processes, their results—and in utilization of such recognition when solving complex problems. He must learn to act creatively between rationality and creativity, logic and fantasy, perception and evaluation, objectivity and subjectivity. Teaching can only aid and motivate. Results can only show evidence of a developed design competence. It is essential to learn architectural decisions based on argumentation. The learning process is started in the "Foundations of Design" course and continued throughout the whole architectural practice as the underlying basis of personal persuasiveness.” (5)

The establishing of formal education for building design, in the second half of the eighteenth century, was one of the events that marked the emergence of Modern Architecture. It is impossible to ignore the revolutionary conditions that characterized the period and certainly influenced architectural thinking. It is no wonder, hence, that the next major initiative in architectural education, the Bauhaus, was generated by no less revolutionary events. Each previous system established itself based upon a comprehensible theoretical paradigm. The rationalistic school to which Soufflot, Laugier, Durand and others contributed in its germinating stages was highly influenced by the thinking of Voltaire, the new civil and military engineering, as well as by historic research. (6) The Bauhaus was highly influenced by new theories of the time in psychology, mainly the Gestalt theory, by mass technology as well as by Marxist philosophy and the concept of Totalart. The masters of the Bauhaus tried to reconcile these various concepts into one educational structure. Probably their greatest achievement was the realization of this holistic educational system. The graduates of the Bauhaus were well prepared to bring fast and radical remedy to the devastating effects of absolutist vanity and totalitarian mass terror. Due to their
concentrated effort. Design became a recognized discipline worldwide. In the late fifties, the theoretical basis of the Bauhaus exhausted itself, due to the refutation of most of its conceptual assumptions. Cognitive and ecological approaches to behavior and visual perception, environmental planning, and especially design studies, followed by high-tech developments, generated a new conceptual situation to which architectural education has to find new and adequate answers.

These new available theoretical sources may allow us to develop an educational model based on factors such as:

(a) Design Principles considered as conceptual generators incorporating structuralist, existentialist, and phenomenologist approaches.

(b) The use of cognitive and ecological knowledge in the design of didactic tasks.

(c) Direct involvement with reality in terms of technology, natural environment, society, and history.

The architectural design process may be considered as being aimed towards the creation and the materialization of the built environment, as well as the creation and the realization of an expressive process meant to convey "use" and "esteem" values to the tenants and public. These twofold objectives, integrating constructive goals and expressive means, may easily accept principles like: totality, involving the permanent interrelation of features; time, which includes notions like quality and reliability; the economical use of resources; synthesis; iteration; growth and change; relationships; competence; service.

The expressive dimension of architectural design asks to see these principles in both content and form terms. In addition, architecture designed for human beings must be made aware not only of the Being of Mankind, in its material sense, but of its Existence as well. This awareness should be considered in its wide sense, including private and public dimension, Inside/Outside connections, static and dynamic processes, all related to the human species, to other life species and the life supporting environment.

The complexity of the issues seems to discourage any attempt to start its study in the beginnings stage. Students entering academic life, however possess already a previous life experience, memories, knowledge and perceptive capacities. By making use of these aptitudes and by encouraging their revelation, an educational structure may be designed. Such an educational structure may adopt, right from the beginning of the pedagogical process, the following methodological assumptions:

(a) In order to reveal to students the spatial attributes of architecture, three-dimensional design may be considered as the core of the study of architectural basics;

(b) The pedagogical principal of learning by doing and exploring is significant since it brings each student to make use of his individual knowledge and imagination, generating and exposing a wide range of ideas, approaches, techniques etc.

(c) Team work and critical involvement can be effectively achieved and aimed to experience conjecturer and refutation, rather than conjectures and confirmations.
These assumptions should be considered initially in relation to surface structures of content and form. In a more advanced stage the same assumptions may be applied in relation to deep structures of content and form and focused on their intrinsic attributes. (13)

This study process may use a reasonable (14) exploration of tasks, as well as a more intuitive, game-oriented exploration of tasks. In both cases, tasks should be purpose-oriented: expected to answer defined design intentions.

This approach may be tested with different paths of structuralist exploration such as Semantic, Ecological, and Historic. The semantic exploration may be based on the sequence: sign, system, structure, space (15). This sequence processes a basic 3D shape, which is rationally comprehended, towards a system, by using deconstruction, reconstruction, and transformation rules related to certain tasks and qualities. In the next stage, these systems are the generators of constructive and expressive structures. Finally, these structures are to be interpreted in human scaled relationships which generate human space. The materialized space is hence available to be experienced and criticized by students and observers.

The ecological exploration starts by involving students in the identification of places and artifacts in environments which possess evident "affordances" (16) for human use and self-identification (protection, contemplation, etc.). These specific "niches," in natural or artificial environments, are systematically analyzed and adapted to a more convenient and comfortable condition, which is accessible to other persons and groups. Finally, a setting has to be designed and built up in human scale, which in addition to the original "use values" has to convey "esteem values" as well.

The historic path of study is based on an investigation of a certain built-up condition of historic value, preferable of urban nature. (17) Each student has to identify basic values in concrete and conceptual terms. Next, a search is undertaken aimed to find out whether the identified values are deployed in a systematic way. Following these investigations, value structures have to be designed and spaces created accordingly.

These explorations may be pursued separately or sequentially. A possible sequence may start with the semantic exploration, followed by an ecological exploration, and ending with the historic study. The sequence may as well start with a historic exploration and continue with the ecological and the semantic explorations.

This study structure does include two additional pedagogical aspects: the study of two-dimensional expressive means and the study of color. Both aspects may be studied in parallel to the 3D studies, either as separated entities similarly structured, or as complementary studies.

Two-dimensional graphic representation may detail technical aspects of the produced 3D artifact. Photographic representation may illustrate expressive means and conditions revealing perceptive aspects or value identification.

Color and expressive rendering may be used from the start without prior preparatory studies. As part of the exploratory process, these means are used, adopted, and made accessible on an immediate and personal basis. In a short time, with some tutorial guidance and mutual help between students, techniques can be improved and refined. This procedure allows students to become innovative in their technical use and reach a sense of self-achievement. The acquired knowledge can in a later stage, be channeled into a
more guided and systematic study frame which may be aimed to achieve more
technical proficiency.

Evaluation of produced work is based on open critic and aggressive
argumentation related to the following criteria:

(a) the degree of realization achieved by the audience of the tasks and
values presented by the proposal;
(b) the degree to which the proposal has product qualities and reliability;
(c) the degree of effective expression the presentation of the material
achieves;
(d) the economical and technical ingenuity deployed in the use of materials
and resources.

Results achieved by these methods have indicated that it is possible to
integrate, in the basic architectural pedagogy training goals of design and
research as pointed out by John Zeisel:

"Design training tends to emphasize being able to present
concepts; research training emphasized testing them. Design training emphasizes making decisions; research
training stresses the importance of learning from them. Design training teaches people how to take risks; research
training, how to minimize them." (18)
NOTES


(6) Peter Collious, Changing Ideals In Modern Architecture, McGill - Queen's Univ. Press, Montreal - 1975) examines carefully the sources of modern architecture (see Ch. 1 and 19) and points out the influence and contribution cultural developments had on architectural theory and education.


(8) Mayall (see (2), page 63) defines "use" value as being related to the supposed basic purpose of a product. The approach has a remarkable affinity to J.J. Gibson principle of "affordances" and establishes a connection between design and the ecological approach to visual perception. "Esteem" value Is in Mayall's opinion, "the amount of value we might place upon the product over and above how well it achieved its basic purpose." This definition brings us in the realm of subjectivity, meaning communication and cultural consensus.

(9) Quality Is here referred as the totality of features and characteristics of a product or service that bears upon its ability of an item to perform a required function under stated conditions for a stated period of time. (Mayall, page 58).
The principle of service is problematic and should be given particular consideration. It is my opinion that service has to be framed to a certain paradigm in terms of people, situations and conditions, and cannot be left open to a general consideration.

Some (see 4) in the conclusion to his article emphasis the "plural rationalities" of built environments, related to physical and psychological "inside/outside" conditions.

In his article J.A. Powell (see 3) emphasizes the difficulty architects face in using conjectures and reputation in practice and their preference to use conjecture and confirmation. Maybe because of this difficulty, architectural education should emphasize refutation in the training of young minds so long as there is a favorable possibility to do it.


By "reasonable" exploration it is meant a search for an "objective reasoning" in the sense described by M. Beardsley (Aesthetics, Harcourt, N.Y., 1958, pp. 462) as a reasoning that refers to some characteristic or set of qualities or relations, within the work itself or to some meaning—relation between the work and the world.


The notion is J. J. Gibson's as presented in his book The Ecological Approach to Visual Perception, Houghton Mifflin, Boston, 1979. See also (8).

It seems that the historic dimensions of the urban environment are more familiar and affordable to beginning students than the intrinsic historic complexities of the specific building.

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"A paradigm governs, in the first instance, not a subject matter but rather a group of practitioners. Any study of paradigm-directed or of paradigm-shattering research must begin by locating the responsible group or groups."

The design procedure transcends the limitation or framework of any given paradigm; but as rules were made to be broken, so, too, are paradigms made to be transcended. Like the outer wrapping of a gift, they serve an initial purpose, are appreciated for their beauty, then discarded in the trash. The introduction of paradigms to first-year students follows a similar story. They have a function but should be appreciated as only a beginning and not as a conclusion. The following suggests an understanding of a particular beginning.

Paradigms have often been utilized to rationalize the design procedure. A paradigm, as understood differently from a model, serves as an example of how things should be done for a specific user group. The responsible group to whom this paradigm is addressed is the beginning student of design, specifically, the first-year student enrolled within an architectural curriculum. This paper presents a paradigm which organizes the relationships among deductive, inductive, and abductive modes of thinking and attempts to discuss these organizations as they function within two dissimilar programs. In one context, the paradigm is looked at within a "Bauhaus" approach to understanding the design procedure; and in another context, the paradigm is viewed within an "holistic" or "pragmatic" approach. In both cases, I would argue in favor of introducing paradigms into the first-year curriculum in order to address and organize the many complex relationships at work within the design procedure.

Throughout any project, there exists a strong influence upon the design process which is dependent upon the written description of the given text, the context from within which the designer is working, the intention or focus of the project description, and the level of complexity of the given project. An understanding of a paradigm can help connect one's thinking and making with the specific context within which the designer works. This connection suggests that the design procedure is deeply rooted in theories of ideas, theories of design, and theories of practice.

Examples from first-year student work illustrate specific modes of thinking and making. Student work from Texas Tech University and the University of Cincinnati illustrates dissimilar modes of operation. The two programs are structured dissimilarly in regard to the approach to and the context from which one is introduced to the design procedure. In both programs, patterns of thinking suggest epistemological descriptions ranging from deductive thought and procedure—deducing particulars from general principles—towards inductive thought and procedure—inducing general principles from particular or specific knowledge. A third, non-logical inference ever present throughout the design procedure is that of abduction. Here, a laterally-moving, creative pattern works to develop a multitude of references structured within and beyond a given context.
These three modes of thinking—two being understood as logical inferences and one understood as a non-logical inference—establish a beginning for a discourse on the design procedure. The organization and relationships among these three modes will be developed later in this paper, but it is important to acknowledge that there exist models illustrating ways we do things and ways we think. The paradigms suggest a context of sorts from which we can apply these methods of procedure. It offers organization and structure for introducing the design procedure to beginning students of design.

What Do Design Paradigms Do?

The paradigm is something which serves as an example of how things should be done for a given group of practitioners. It establishes a framework from within which we think and make. The "holistic" design paradigm for the designer to his environment is dependent upon perception, form, precedent, context, program, and structure. This model is used to organize the variables which affect the relationship of the designer to his environment. Paradigms are also used to organize the relationships among deductive, inductive, and abductive thinking. Deductive and inductive methods generate a linear model which extends vertically from general principles to specifics. Both methods are logical inferences and work interdependently. Deductive reasoning always works within one's understanding; and, therefore, the conclusion is always formulated at the beginning. Inductive reasoning works beyond one's understanding. Abductive thinking is quite another matter, independent from the logical inferences. We will discuss this further in the text.

Deduction

Deductive thinking is entirely internalized. It is rational. It is reaching a specific conclusion by use of reason. For example, descriptive geometry is dependent upon the general principles set forth by Euclid. These assumed "cannons" have generated complex and specific subsets. The specifics, known as descriptive geometry, have all been deduced from the general cannons of what is a point, a line, and a plane.

Deductive thought utilizes the internal understanding of the rational mind. Deduction functions within a given context, within a given understanding. The projection of knowledge within one's scope is clearly dependent upon the power of the general principles employed. Louis Kahn was a deductive thinker—his work, a result of internal questioning. His work holds rational and intuitive strength. Very few architects have the capacity to work well deductively.
Inductive thinking works beyond one's understanding. It is logical reasoning that generates a general law. A general law exists because particular cases seem to be examples of it. As an example: "Trash is put out on the sidewalk on Thursday morning. Trash is on the sidewalk this morning. Therefore, it must be Thursday morning." Inductive reasoning is empirical knowledge. Empirical knowledge is knowledge gained by doing. It is acquired knowledge. The outcome or conclusion is always beyond one's initial understanding or preconception. The conclusion begins as an unknown and, therefore, must be deduced through specifics.

Poetry is often inductive. It reaches its conclusion through inference. One must read it and formulate correlations based upon the reading—based upon the "doing" of the reading. One must work beyond the "text."

Using an example of an inductive thinker, I would like to refer to William Pena's approach to programming. William Pena wrote a book entitled Problem Solving. His idea behind programming is to minimize one's preconceptions about form for as long as possible during the initial programming phase. His intent is to induce a solution beyond one's initial preconceptions. Every project would be a natural result from the program. Many designers work in an inductive mode similar to the structure of Pena's Problem Solving. One can argue with its validity, one can disagree with his thesis—nonetheless, it remains a good example of inductive thinking.

Abduction
Abduction is significant in its operation. Abduction is a non-logical inference. As a designer's experience expands—as one's understanding of culture, form, and meaning develops—one becomes perceptive to the fact that the forms we create hold ever-potent meaning and reference and that through lateral shifts, meaning and reference are brought to light. Michael Graves is an architect versatile in abduction. His work is idiosyncratic and reads as a multitude of texts.

de — reversal or undoing
in — not, lacking or without
ab — about

On Design

In reality, designing is analyzing and synthesizing simultaneously—it is an active creative process. Design is the evolution of an idea via a mark or cut of the chipboard. The mark informs the designer. However, the mark one makes may carry a dissimilar meaning or intention from that which the designer held originally in the making of the work. The designer works within two "modes." One is within a logical inference, vertically illustrated through deduction and induction. The other is within a non-logical inference, working laterally through abduction.

On Student Work

The drawings and models of student effort reveal half of the discourse when viewed as a collective whole. Given sets of organizations and relationships must be addressed so that the student can comprehend a context from within which he or she is writing his or her segment of the text. Take for example, the study of shape. In working with shape, one is, in fact, working with figure, ground, contour, and field—variables which are interdependent and which establish the context from which the designer works. Without a thorough introduction of all the variables within a given context, the design procedure can never really establish a conclusion. One must be given the rules of the game, so to speak, in order to correctly play the game or, at the very least, to understand the game. In this paper, the design procedure is the game and the first-year students are the players. The paradigm introduces one to the rules of the game.
The more complex the problem statement, the more important the role of the paradigm and the more difficult becomes the task of writing the project description. As projects themselves become more and more complex in their scope, it becomes more and more difficult for the student to solve the problem intuitively. Consequently, the better student illustrates a conventional mode of thinking, working from the general principles to the specifics and back again, inducing clearer understandings of the general principles and then again deducing from these the refined specifics—working and reworking, going up and down the ladder of a logical inference. Occasionally, a student takes a side door because a mark he has made triggers a curiosity. This lateral movement through the process is abductive; and though it is by far the most creative in its nature, it works outside of the two logical inferences and can lead a student and his project away from the focal issue. Though there is, no doubt, some value in being side-tracked during the design process, it can nonetheless produce work outside the given parameters and make it difficult to verify whether or not the student has, indeed, successfully addressed a particular issue.

An Approach at Texas Tech

First-year students at Texas Tech University are given abstract, basic design exercises leading to the development of compositional and conceptual thinking. The work itself is a balance between two-dimensional and three-dimensional exercises and introduces the student to an understanding of architecture via a "Bauhaus" approach. The first-year studio consists of isolated, relatively brief abstract exercises, each of which addresses a specific focus, a specific issue of investigation. Examples of such specific project statements address figure/ground, color theory, geometry, scale, structure, and sequential spatial relationships. In addition, bi-weekly lecture seminars supplement the studio experience; and these lecture periods addresses the larger context to which the studio projects belong. The lecture series, in part, introduces the students to the rules of the game. It attempts not to suggest how you should be playing the game; rather, it addresses the important organizations and relationships of those projects on which the students are currently working.
Beginning students of design at the University of Cincinnati have recently experienced a very different approach to the introduction of the design procedure on the making of architecture. At Cincinnati, students are "wryly thrown in over their heads" from day one. The approach to architectural production works within an "holistic" or "pragmatic" context. The design studio introduces students to a series of place-making exercises. These place-making exercises begin within the private realm, given a simple function and a given context. Through this holistic, somewhat pragmatic beginning, teachers and students begin to de-compose the "real world" into a series of focal issues with elementary projections. Entry, focus, boundaries, and light are studied within a functional, sequential, and cultural setting. One works within the "built environment," inducing the general principles. Students begin in a framework of what appears to be a part of their "world"; and from this framework, they develop a knowledge of principles and ideas.

This is, interestingly, a 180-degree turn from the way in which one is introduced to "architecture" at Texas Tech. At Tech one is given the principles in the abstract and then taught to apply the specifics to the making of a building. At Cincinnati, one is given a "pragmatic frame" from which one investigates and induces general principles from specific givens. As Texas Tech has an accompanying lecture course revealing and developing connections between the studio exercises and the built environment, so too, the University of Cincinnati offers a weekly environmental design seminar which parallels the design studios in theory, helping the students to understand the principles extracted in the studio and applied in their perceptions of the built environment.

My intent in teaching first-year studio is to construct a framework which the students can feel comfortable with; to "establish the rules of the game." Within this framework, one induces principles and deduces specific solutions. The spectrum of concerns addressed by freshmen students illustrates a wide band—from "commodity to anti-commodity," "firmness to anti-firmness," "delight to ugliness." These terms illustrate a broad spectrum rather than infer a polarized structure. Students work falls somewhere within this vast field.
Let’s take as an example the first-year studio exercise which has now become an annual tradition at Cincinnati. The studio exercise calls for each student to design, construct, and sleep overnight in a temporary shelter. The materials are limited to a specific amount of corrugated cardboard, brown paper, and wrapping tape. Students may also utilize their choice of a small amount of wood, glue, string, rope, or plastic film.

Though the project statement suggests that each student ponder the nature of corrugated cardboard as well as consider the probable climatic conditions to be encountered on an early autumn night in Cincinnati, the results when looked at as a collective whole reveal a wide range of concerns which illustrates an equally wide range of understanding and complexity. The project allows the students to demonstrate their understanding of architecture, and this is the strength of the exercise.

What the shelters end up looking like is a very important factor in this project. The diverse forms and shapes generate discussion and reveal the complex issues addressed in the project by the students themselves. It allows students to discover a variety of strengths and weaknesses by themselves without being shown or told what to look for.

The exercise is a success for many reasons. Though some shelters do not completely “succeed” in addressing the underlying concerns of “commodity” and “firmness,” most address the concern of “delight”—an affirmation of a beginning student’s interest of architecture.

An understanding of architecture and interior design is based upon and rooted in many things. The project itself suggests the beginnings of this understanding. Interestingly enough, nearly all the projects are intuitively deduced with little development or re-addressing of form, shape, purpose, or structure. The project descriptions which follow this initial exercise continue to develop these general principles. The principles are carefully studied within more and more complex project descriptions. This beginning at Cincinnati challenges the approach used at Texas Tech. Tech often introduces the first problem as a two-dimensional figure-ground problem. Immediately it offers an intuitive or deductive response, still working within the abstract. Transferring to architecture the principles gained from abstract exercises is what I find most students struggle with. At this point in time, I am hesitant to support one approach over the other. Rather, I have found that the process itself is dependent upon the context for all students and that the making of something is rooted in the thinking about the making; and this connection or relation tends to structure one’s understanding of what is architectural production.

Establishing a Need for Paradigms

A specific focus or intent allows a student to investigate and develop an understanding of a specific issue. Depending upon the thoroughness of the context and the amount of knowledge given to the student initially, the student can proceed deductively or inductively. If the “field” is covered in its entirety and the student equipped with a given framework within which to work, then the projects themselves are usually deduced. If a paradigm is introduced and the “norms” of a variable are identified, the specificity of the project description is clearly understood and specific solutions are deduced from general principles. But when the project statement is about search, when the variables and context are left undefined, then students generally work inductively, searching to induce general principles.
It is important to "load" the project descriptions and to introduce the context of which the project is a part. The paradigm, or model of sorts, can become a means to illustrate how things should be done—how the project should be understood. If the paradigm is not introduced, if the rules of the game are left vague, then criticism becomes subjective and without content. The paradigm is necessary for structure. If figure/ground becomes a lesson to understand, then the context of what establishes figure/ground must be rooted. The perceptions of shape, contour, field, figure, and ground must be understood as variables within the paradigm. The paradigm is a preamble to the design process; and the design process becomes a means of understanding the paradigm. The two work interdependently.

On Paradigms

Paradigms organize and establish the relationships among variables within a given context and serve as models illustrating how these variables hold together for a specific user group. Within the field of design, there exists a tremendous fissure between general principles (thought) and specific knowledge (skills of doing). Paradigms help organize the relationships within modes of thinking, epistemology (empirical and rational), and technology (art and science). Paradigms help organize the relationships of variables allowing designers to understand design within the built environment, in understanding the design procedure within this context. Lastly, paradigms help illustrate the variables and their relationships to the specifics in design for designers to understand and work within.

Without a paradigm, it becomes difficult to agree upon the rules of the game and the variables to be employed within each facet of the game. For example, the most specific model for understanding design as something spatial or visual, one must realize that all things have a field (datum frame), contour (boundary), figure (object), and ground (field or background).

Working together, these variables induce shape; and shape with content induces form. Form is also a variable in a similar model. One cannot alter one without affecting the other three. When three or four of these variables are unknown, the design procedure is in trouble. If we are out of our context, or if the context as introduced to the designer is incomplete, then is without proper structure as a studio exercise the project.

In a general way, paradigms illustrate the variables within which designers must work. Abstract projects have a context, as do "pragmatic" or "holistic" projects. Within a general organization, the variables of the designer to the built environment are the following:

- perception - an active creative process, dependent upon the participant
- form - the visible shape of content, "Ben Shahn," shape and meaning
- precedent - culture, history, case studies
- context - a frame of reference, a room, culture, place
- program - function, pragm, purpose, and process, and presence
- structure - technology, (science & art), organization, order
In another light, one might view elements within all contexts by use of the following information model. The model illustrates an holistic and discrete (integrated and differentiated) information structure:

I  Contents
II Purposes
III Processes
IV Presences

V  Combine IV and II
VI Combine II and III
VII Combine III and IV
VIII Combine All

purposes  - pragmatic
          - spiritual
          - intellectual
          - architectural
          - immanent/inherent purposes

processes  - programmatic searches and expressions
            - activities
            - cultural processes
            - technological processes
            - socio-ecological
            - bio-ecological
            - human processes

presences  - presence as identity/character
            - immanent/inherent processes
            - physical, a-physical, metaphysical (things, ideas, systems, inspirations)
            - scales of presence
            - context and content
            - spatial and temporal
            - astrophysical, geophysical, cultural
            - architectural presence
This model of purposes, presences, and processes illustrates the dependent relationships within an holistic information context. A program working within a "pragmatic" structure introduces design students to these classifications. This paradigm can be broken down into pragmatic subsets of activity and space analysis, yielding the following outline:

Activity, as processes in space and time

"Actors'" perceptions of space and time

Spatial qualities required or implied by activities

Criteria for activity spaces: presences, purposes, processes

Quantitative and qualitative: Focal, connective, service & served

"Site" as presence in a context: text, context, perceptual, conceptual

In general, every exercise has purpose, presence, and process. These terms are interdependent, as are figure, ground, field, and contour. When one affects any one of the variables, the other three have simultaneously changed. The paradigm, in an "abstract" context, works similarly to the paradigm in a "pragmatic" context. The variables differ, but the modes of thinking (inductive, deductive, and abductive) remain constant. One introduces general principles which are in turn responsible for deducing specific knowledge. In this light, one must address epistemology as being the study of knowledge; and from this knowledge, we deduce two distinct modes of operation—empirical and rational. Empirical knowledge is knowledge gained by doing. It is induced. It is knowledge gained through art and the applied arts. A sculptor is an applied artisan. Another mode of operation is rational thinking. Rational knowledge is knowledge gained by reason. It is deduced. It is knowledge gained through science and the applied sciences. A structural engineer is an applied scientist. Together, these variables in epistemology work interdependently.

General principles and specific knowledge are ranges in a vertical scale. Empirical and rational, inductive and deductive thinking are modes of operation within this scale. Purposes, presences, and processes are variables on an holistic information model which can be translated into the context of the designer. The designer makes things (visually and spatially) within the built environment. The paradigm of the designer to his environment embraces perception, form, precedent, context, program, and structure. Finally, as with all things made or created, there exist four dependent variables: figure/ground, field, and contour. From this deduced specific paradigm, all general principles can be induced; therefore, one might find the introduction of paradigms helpful. My own understanding continues to expand, and the development of paradigms illustrates this understanding.
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APRIL 8 & 9, 1988
AN INTRODUCTION TO
FIRST YEAR DESIGN STUDIO

SCHOOL OF ARCHITECTURE
TULANE UNIVERSITY

Professors Adams, Crosby, Helmer, Nius, Scheuermann

ON SHIFTING GEARS
ON INSPIRATION AND ENQUIRY
ON WHOLENESS OF RESPONSE
ON 'GOING BY'
ON THE NATURE OF THE QUEST
ON INNER CONSTRAINTS
ON THINKING AND SEEING AND DRAWING
ON TAKING A STEP AT A TIME
ON ATTITUDE AND CRITICISM
ON STEPPING ASIDE
ON COMMODITY AND FIRMNESS AND DELIGHT
"You have to teach somebody as they’re going by. If they’re not going by, you can’t teach them. What they must do to be going by is to practice. As a teacher you stand on the sidelines of that process and prod them along the way.

ON SHIFTING GEAR

As you begin your first year at the School of Architecture, you take the first step in a five year educational experience that many of you are likely to find quite different from any that has gone before. The following introductory remarks have been set down in an attempt to give you, at the point of entry into that experience, an idea of what you may expect of it. Most specifically they are meant to guide you through its first year. It is intended that you should keep this text, so as to be able to refer to it later for clarification of the issues it raises.

Most of you will have recently completed twelve years of schooling based largely on the use of verbal and numeral languages, with an emphasis on the reasonable, the quantifiable, the "provable." A number of you will have had some experience, in arts classes or lessons, of another arena of experience as well, wherein the sensate and aesthetic are presented as being of greater importance. In the former, those subjects in which you were learning "about" things (You don’t study the Crimean war to be able to go out and make one), a large segment of what you were expected to acquire in the way of information no doubt consisted of "facts" that could be learned and then given back in a form that could be demonstrated as being right or wrong. In the latter area of inquiry, those more "creative" subjects, more room was probably made for the intuitive, the playful, the "felt" experience. There you might have gleaned the notion (it is a popular enough one) that creativity means free-spirited and free-wheeling "self-expression," something in opposition to the idea of discipline.

ON INSPIRATION AND ENQUIRY

Neither of the opposing sets of values represented by these two educational approaches, taken singly and without acknowledgement of the other, will have been sufficient to provide you with an accurate picture of the study you are about to begin. The reason for that is that you will find in architecture a richness and density that comes in large part from the fact that, as an art, as a discipline, it draws deeply from both worlds, from both the sensible and the sensate, the logical and the intuitive. For some of you, the transition from where you have been into this unfamiliar realm, the new ways in which you will be asked to think and see and respond, the processes in which you will be asked to submerge yourself (quite specifically submerge your "self") may be perplexing, even frustrating. A few of you will no doubt discover in the course of this year’s experience that architecture is not a world that you can comfortably inhabit. For the rest of you, it will be a challenging experience, offering substantial rewards.

Certainly you will be asked to be creative in your thinking and in your solutions, but of that creativity two important things must be understood. Both unfortunately run contrary to prevailing popular ideas about creativity. The first is that real creativity can only occur within a context of rigorously intelligent investigation, wherein the supposed "opposites" of analysis and
synthesis may be seen to fuse, wherein rationality and inspiration are perceived not as adversaries between which one must choose, but as equally desirable parts of a whole.

The second thing to be understood about creativity is that it can only be born of an open-minded, truly radical climate of humility. In such an atmosphere, relaxation occurs and confidence grows. Preconceptions are put aside in order that solutions may grow naturally from problems, rather than being forced upon problems in the ill-fitting square-peg-in-a-round-hole fashion typical of a closed-mind design process. If you are on a voyage of discovery, you cannot by definition know ahead of time what it is you will discover.

A comment about "originality" is appropriate here as well, since the ideas encrusting that word are first cousins to those commonly choking creativity. Perhaps the most important thing to say about originality is that it cannot be "made" to happen, but must be "allowed" to happen, will only really occur when you are "looking the other way," absorbed in a quest for understanding, a quest for appropriateness. If you seek originality as a goal, confusing it with "differentness," it will elude you at every turn. As the Andalucians say of the making of wine, "Casina." ("No big deal" approximately) "In Andalucia we do not make the wine. We allow it to make itself." If during your first year you begin to come to terms with the depth of meaning inherent in that statement, then you will have gotten a good initial grasp of where creativity lies.

As regards the realm of facts, there will indeed be a body of technical information with which you will need to develop a working familiarity, because failure to do so would be a crippling factor as you try to make architecture. Here you will study building typology, architecture as science, architecture as history, as culture. You will not be given exams on facts in the design studio, but such information constitutes a base line (and a quite necessary one) for the creation of architecture.

ON WHOLENESS OF RESPONSE

Concerning the idea of creative inspiration on the one hand and intellectual enquiry on the other, we believe that it is important that you set about now (if you have not been so lucky as to have done so already) to disabuse yourself of an erroneous notion to which we have all been subjected to the point of overdose. It is the idea, rather deeply imbedded in our culture, that sets up an artificial distinction between rationality and inspiration, feeling and intellect. That decisive paradigm holds that things must be either such-and-such or such-and-such, does not allow that they may be both this and that. It is a view that effectively blocks the complex levels of meaning possible in work accomplished by those who have escaped its stranglehold. It further allows for the notion that one may select as "good" or "worthy" certain parts of a whole, reject other parts as "unworthy." In architecture, there is no surer path to fragmentation, shabbiness and boredom.

Not a year passes in first year design studio that one or another student, caught in this either/or bind, approaches one of the faculty with a plaintive, almost desperate plea that it be made clear, "once and for all," which thing we are finally after: Do we want a design solution that "works" well in terms of satisfying practical use requirements or do we want a design that is aesthetically satisfying? Or—to complicate things even further—do we want a design that in its form makes some kind of statement about the human condition? The stumbling block is of course the "or" lurking there in the question. With the "or" changed to "and" as it ought be, the question becomes answerable with a simple yes. We reject the question in its initial form because, first of all, it leap-frogs quite simplistically over the fact that, in any given solution, part of the quite qualities, while in another the smoothness with which it answers to practical needs can contribute substantially to its beauty. Finally, we reject the question because we cannot accept the artificial
mental model out of which it springs. It is a view that does not produce wholeness and quality in the result.

It will be difficult to get past this what-is-this/cannot possibly-be-also-that stumbling block, first because you, like most of us, were no doubt brought up to accept such decisiveness as providing a true picture of "reality" and, second, because to abandon the simplistic thinking inherent in it is to come face-to-face with a more complex reality which, though ultimately more rewarding, nevertheless demands much of us. It calls for us to relinquish a comfortably compartmented view of things, quickly replaces a stash of safe answers with a flood of questions, challenges us to let our minds move in new ways, asks of us that we go careening down lateral paths, forswearing easy solutions which, though they might have been easy, were never solutions at all. It asks that we think a dozen thoughts at once, see a dozen ways at once, that we put aside laziness and pay attention to a degree to which we are likely to be altogether unaccustomed.

ON 'GOING BY'

As should be obvious from the above comments, we will demand much of you. But as we do, you ought always keep in mind the thrust of the statement that begins this introduction to first year design. Made recently by a musician friend long committed to both teaching and learning, it holds particular relevance for architecture. The degree to which you, as a first year student, acknowledge or fail to acknowledge its truth will be of critical importance to your success in this endeavor. What is meant by "going by" is that you are engaged in a search, and that you realize that it is your search and no one else's. You must care about that search, be truly "engaged" in it, connected to it. Thus you will, in a very real sense, take on responsibility for the conduct of that search, in other words for your own education. No amount of cajoling or bullying or tender loving care on the part of your teachers can by itself cause you to learn what you need to learn. The search for answers that you begin now is endless, because the questions are complex and varied. Your teachers, still themselves engaged in similar searches and having gained experience in the process, are here to shape a course for that search, to guide, to prod, question, criticize, finally to evaluate the results.

ON THE NATURE OF THE QUEST

This course is, as its name states, a studio course. Those of you who have taken courses in such things as painting or drawing will find this course somewhat similar, though different in several significant ways. First -- as has been earlier suggested -- you are likely to find the thinking here to be a bit more structured, with greater emphasis on more rational and analytical components. Second, the nature of architecture is such that you will not (for obvious reasons involving time, money, etc.) be producing a finished product, as you might a sculpture or painting. Instead you will produce a design, a scheme for that finished product, and at a substantially reduced scale. You will thus (while a student) miss the opportunity to experience full-scale the result of your scheming, and you will miss (even in practice as an architect) the complete control over the shaping of the final product that the artist-craftsman enjoys. These two differences between your study of architecture and what a study of, say, ceramics might involve are significant enough, but another difference is surely even more so.

Like so-called "pure" art, architecture is an expression of the human spirit, and a particularly powerful one. In fact it has been referred to as the "mother" of the arts, no doubt in recognition of its ability as an art form to profoundly affect people's lives and spirits. But there the likeness begins to break down, because beyond its expressive role, beyond its capacity to give meaningful
form and order to the built environment, architecture takes as its task the making of places (usually though not always shelters) for the carrying on of daily human life. It thus becomes an implementing means to the accomplishment, beyond its (and painting's or poetry's) more purely expressive ends, of another end: that of sheltering human activity. At the point that architecture embraces that task, certain very specific constraints enter the picture, constraints that set architecture apart. That is not to say that constraints do not exist for the painter or the composer or the ceramist. Anyone who has tried for the first time to throw a large vessel on the potter's wheel has experienced the limitations of clay. Anyone who has produced a teapot only to find that despite its seeming harmony of form, the spout is too low for it to hold and brew tea know the limitations imposed upon form by use requirements. But the use requirements of architecture are usually considerably more complex than those of a teapot, usually involving -- even in a single project -- the need to accommodate a wide variety of human activities, along with the furniture and machinery connected to those activities. Beyond that, the constraints imposed by the different materials and systems that go together to build architecture almost always go beyond those of even symphonic music, let alone painting or poetry or teapots.

Another constraint to which architecture must respond, that of site or context, sets it apart from all but such things as paintings (murals) created for a certain location or site-specific public sculpture. This contextual constraint is a tremendously important one, because it is at the point of responding to it that architecture is offered the opportunity to make a contribution beyond individual "look-at-me" buildings into the shaping of larger environments -- streetscapes, vistas, the ordering of whole towns and landscapes.

Yet another "external" constraint is worth mention, one that is common to architecture and other commissioned work, but absent for many artists. That is the constraint imposed by the presence of a patron or client and the involvement of that client, to a greater or lesser degree, in the shaping of the work. Generally speaking (and for reasons largely economical) the larger the work the more likely it is to have been commissioned ahead of time by a client who will have direct input into its making. That is almost always the case with architecture, at best, the client's legitimate involvement (if he or she is of the more enlightened variety) offers the opportunity to enrich both the design process and the result.

**ON INNER CONSTRAINTS**

In addition to responding with intelligence and sensitivity to the set of "given" or outwardly-imposed constraints of use, materials and context peculiar to architecture, architects, like all artists, find it necessary to create certain purely formal constraints for themselves, to limit their language of form. As all artists know, to attempt to create a work of art (sonata, haiku, or monumental sculpture) without limiting one's means of doing so is to invite chaos. Indeed the balancing-act, the tightrope-walk between the order that is achievable through tightening of self-imposed formal constraints and the variety or "liveliness" introduced by loosening those constraints is perhaps the central formal act in which the artist engages in creating a work of art. The creation of order is easily achievable, by simple repetition of form. Likewise the creation of variety is easy, simply by varying the form enough. However, the end result in the first case is likely to be boredom, in the second a chaotic mess. To create a meaningful dialogue between order and variety, a kind of poised tension between them, is altogether another thing, requiring a fully developed appreciation of their complementary nature and an understanding of the idea that art, if it is to mirror life, must, like life, encompass both order and variety, expectation and surprise.

These remarks regarding the various constraints affecting architectural design are made here not only because they point out a significant factor in the practice of architecture but most
specifically because first year students often find themselves at odds with the limitations imposed upon them by such constraints. Rather than seeking to understand their nature and the positive ways that they can be used in shaping design ideas, such students tend to put an inappropriate (and altogether unproductive) amount of energy into trying to avoid them, get rid of them, make an "end run" around them, pretend they do not exist. A far more worthwhile attitude toward such constraints would be to look at them instead as challenges, as opportunities that are an organic part of the process of making architecture, and not alien fetters upon creativity.

ON THINKING AND SEEING AND DRAWING

You will find that we assign problems and critique solutions in first year studio in a way that calls forth from you the kind of clear thinking demanded by architecture. We will counsel you to "keep it simple", but at the same time to avoid the simplistic, to recognize that the clearly conceived idea, no matter how complex its structure, is, by virtue of its clarity, essentially "simple." We will hope to guide you toward what is called elegance in your thinking and in your design solutions, to help you understand the leaness and economy of means inherent in the idea of elegance, to separate it from notions of fanciness, expensiveness, impressiveness. We will point out the inherent poverty in the thinking that seeks only "effects," ask instead for substance. Perhaps most of all we will ask that you begin to see in a deeper way, a way that is both more comprehensive and more comprehending. We will ask that you carry the act of seeing beyond what is required for the mere naming (categorization) of things, into a realm in which the order, the structuring of the physical world begins to be understood. As future architects, you will no doubt create some of that physical world. The quality of seeing that you develop now will be of crucial importance to the quality of the world you bring into being.

In architecture, there is a specific tool for the development of that seeing ability, a tool called drawing. It is most important that you develop a facility in the use of that tool, to the point that it becomes for you a way of seeing and a way of thinking. You will thus find in first year design studio a strong emphasis on the drawn idea as distinct from the verbally described. You will be asked to draw and to make models (a kind of three-dimensional drawing, if you will) not only as presentation tools but, more importantly, as design tools. A common idea has it that one can "design" a thing in one's head, in one's "mind's eye," and then, once it is "thought of," or "designed," one need only "put it down" in a drawing. Now and again a client possessed of such an idea appears on one's professional doorstep. He already "knows what he wants," needs only that someone "draw it up" for him. What he fails to understand, beyond all else, is that "knowing" and drawing are not discreetly separate acts. Whatever the idea, if it can be envisioned in the mind, then it can be drawn. If you cannot draw it, then your envisioning is but a mirage, not a concrete idea. To have an architectural idea is to draw it; otherwise you only think that you "have" it.

You will thus find that in order to arrive at an idea of any quality, you must start with drawing from the beginning, then continue to explore the idea through drawing at every stage. Drawing is therefore a tool for both exploration and communication (including communication with yourself) and often your teachers will refuse to critique a design idea until you have drawn it in a thoughtful, communicative way, so that, through your drawing, it can be fully appreciated.

ON TAKING A STEP AT A TIME

The first thing you will seek, in approaching a problem assigned you, is an idea, a concept on which to build further. A concept is the essential point of birth of a design, level number one in the design process. It may be a formal idea, it may pertain to siting, to circulation, to a perceived
pattern in the building's or place's functional requirements. In its simplest form it can, if it is a clear concept, be expressed as a diagram. As has been earlier pointed out, a quality concept is more likely to spring forth if given room to do so by an openness of mind, rather than being forced. As regard to ideas, there is a common trap into which first year students often fall. It consists in trying to insert too many parallel ideas into a single solution, to the point that the result is overloaded with ideas that are generally not well developed and that tend to cancel one another out in what the French refer to as an embarrassment of riches. It is thus important to get past a confusion between quality of idea and quantity of ideas. There cannot be too many good ideas, as long as they are each essential and contribute to the reinforcement of the underlying concept. But as we often counsel, it is frequently wise to save some ideas for the next problem.

Once there is a concept, a next step in the design process is called for, that of design development. It refers to the strengthening, the playing out or expansion of the basic approach, the resolution of problematic issues, so that the concept is strong and clearly stated, even if subtle, so that one's own understanding of it grows and matures. This stage might involve enrichment of the idea by harmonic overtones, variations on the theme, perhaps the plixance of counterpointing it with a second idea, the articulation of reinforcing patterns and rhythms and relationships.

The final design stage is the one in which smaller-scale details are further developed, where surfaces, textures, materials are considered, selected and modulated to express the underlying concept or concepts, where further adjustment and final fine tuning occur. For a design to be complete and fully worked out, fully satisfactory, it must include all three of these foregoing steps, and you will find your teachers' criticism structured to a large degree around them.

ON ATTITUDE AND CRITICISM

One of the more aggravating aspects of learning (searching) is that the process involves constantly tripping over one mistake after another. You will do a lot of things wrong, overtly and embarrassingly wrong at times (it is hoped that you will, when appropriate, have the good sense to be embarrassed), at other times wrong only in the sense (which almost always pertains) that they might have been done better. From your guides, your teachers, you will hear a lot about what you have done or are doing wrong; the character of their criticism will thus surely be more negative than positive, though its intent is constructive. For many of you, the criticism will be painful unless you manage to separate yourself to some degree from it, to the point of accepting it as criticism of the work rather than of you as a person. Only if your attitude toward the work is criticized (as it might on occasion be) will it be the latter. Even then, the criticism will not be so much of you as of an attitude inappropriate to the task at hand.

The issue of attitude is an important one, and when it comes time for your teachers to evaluate your performance on an individual problem or in the course as a whole, your attitude will be perused as carefully as will be the work you produce. In practice, there need hardly be a distinction: a shabby attitude will show up quickly in the quality of the finished work. But there are other ways in which we evaluate attitude, some obvious, some less so.

First, and most obviously measurable, is your attendance and your degree of participation. You will be expected to be in class during class hours, and moreover to really be there, engaged in what is going on, whether it be focused right in front of you on your own drawing board, or in a group problem assignment, discussion, critique. Now and again a student claims not to be able to work in the studio and attempts to work instead at home. Your teachers have long since recognized that the quality of work has suffered drastically in every such situation, often to the point of failure in the course. Such a result comes to pass first of all because much of what you learn in
design studio comes from participation and involvement, no matter how "private" a person you may think yourself to be, and, second, because explanations of problems, the delving into issues raised, is an ongoing process, sometimes involving changes of stipulations even, that is far from being encapsulated in the first day's presentation of a problem, but that continues in every class meeting. Therefore attendance is mandatory and our rules regarding it in accordance with published university-wide policy. Three unexcused absences may thus lead to failure in the course. In addition to scheduled studio hours, you will find the building and studio accessible to you 24 hours a day, seven days a week. You will no doubt wish to take advantage of that fact.

A second measure of attitude is made relative to the ways in which you seek and respond to criticism. It is a major issue because, as has been earlier stated, you may never have received a degree of criticism--except perhaps from parents--to match what you will receive here. As regards seeking criticism, it is important that you remember once again that it is your search, your quest, and that your teachers are not here to force-feed you, but rather to make challenging demands of you, to then assist you in meeting those demands. You will receive some unsolicited criticism on a day-to-day basis, but essentially--except in formal juries--you will have to seek it. When you do, it is expected of you that you become a participant in the process, that you treat it as a constructive dialogue between you and your critic. In other words, your teachers are available to you, but they will not hound you if you show little or no caring for your own work, if you demonstrate a reluctance to have it criticized. Neither should you allow yourself to get into the position in which you are so dependent upon ongoing criticism that you cannot draw the next line until the one just drawn has been approved. The desire for approval is a natural-enough part of seeking criticism, but you must be careful to resist the idea (an appealing but erroneous one) that there is at every step along the path an "answer," a "way" that, if you can only discover it, will assure you of "getting it right." As has been said, there are many answers. It might be said at this point too that the quality of your questions, of your inquiry, is more important to developing an understanding of the design process than are "answers."

You will receive (solicited or unsolicited) the criticism, the opinions of five different faculty, or fellow first-year students, occasionally of upperclassmen, of friends, of visiting faculty other than first year. Those opinions, the advice involved, will vary, sometimes to the point of confusing you. It is natural and, in the final analysis, good that they should vary, because such variety helps prevent dogma and rigidity from gaining a foothold. In order to get yourself past the confusion and seeming contradiction that will inevitably result from time to time, you will have to stand back a bit from the criticisms, sift through them, try to find in them an underlying agreement that may not at first have seemed to be there or, failing that, glean from them something of which you can make creative use in solving a design problem. Bear in mind too that much of the criticism you receive will be in guiding the way you think about issues and problems, so that you may find your own solutions rather than being given them.

Not infrequently students think it appropriate to argue with criticism, to justify solutions, to defend themselves in either individual or group critiques, rather than to listen and absorb. No one wishes to make docile sheep of you, to take from you all conviction about -- thus responsibility for -- what you are doing, but beyond a certain point a defensive attitude concerning criticism becomes a virtually impenetrable blockage against learning, and is totally counterproductive to what we are all attempting to make happen here. You would be well advised to try to adopt -- however difficult it may be for you -- a positive attitude toward criticism. That attitude might see criticism as a goal rather than a cross to bear, for in fact it is. There will come a time when there will be no one to thoroughly criticize your efforts but yourself. When that time comes you will have had to develop the art of self-criticism. Practicing it now will aim you toward the acquisition of that necessary talent.
ON STEPPING ASIDE

Earlier it was stated that you would be asked to submerge your "self" as a way of opening up to ideas, to true creativity of spirit. Relative to that concept, your teachers in first year design studio have developed a series of "taboos" with which you will become quickly familiar. When we ask of a student that he or she explain a design decision, or when a decision is criticized, responses involving phrases such as "I wanted" or "I like" are inadequate in our view. We advance the proposition that such personal reference stances are neither substantial nor appropriate. If design decisions are based alone on "I want" and "I like" then there can be no growth, no learning, but instead only an aimlessly meandering chain of whims, through which no meaning can be communicated, out of which no worthwhile architecture can be made. Instead we ask that you arrive at design decisions that can be explained (or, even better, that explain themselves) in a clear and comprehensible way, that make sense within the larger context of the issues raised by the problem rather than only in the narrower confines of personal taste. At the moment that you begin to move beyond the tastes, the preferences and prejudices with which you arrived, the moment you begin to replace them with propositions that can be weighed and measured and discussed with open-minded intelligence, will be the beginning of a process of growth and expansion out of tired modes into ones full of freshness and vigor. That growth, that learning of new things, is what you are here for.

ON COMMODITY AND FIRMNESS AND DELIGHT

The Roman architect Vitruvius said of architecture that it ought manifest what he termed utilitas, firmitas and venustas, three words translated into English as commodity, firmness and delight. Commodity refers to a structure's fulfilling its requirements for use, whatever they may be, firmness to its integrity and resistance to deterioration, delight rather obviously to those pleasures offered beyond utilitas and firmitas. Balancing these concepts and linking them together--like the binding mortar peaking out between them--are strongly implied ideas of completeness and appropriateness and proportion.

These terms and the ideas they represent refer of course to buildings, and they may be taken as an outline of the things you can hope to learn about architecture. In structure courses you will investigate firmitas, in technology courses utilitas, in design studio all three, with perhaps more emphasis on utilitas and venustas. But these three words, and the "mortar" concepts that bind them as well, may be taken as more than a measure of the quality of buildings. They might be taken, first, as a measure of the quality of experience (How useful, how "firm", how delightful will it be?) that you make for yourself here at the Tulane School of Architecture. Too, they might be taken as saying something about the thinking and the seeing that you manage to bring to bear on that experience and on the profession for which it is meant to prepare you.

Finally, whether you depart this experience five years from now to become an architect or not (some of you will go on to do other things) you can look back at your enquiry into the nature of utilitas, firmitas and venustas as having been an appropriate preparation for any number of potential undertakings, most especially that of an enlightened life. Far beyond the making of buildings architecture stands for and shapes a way of comprehending humankind and the world humankind inhabits, a way that, if embraced, if fully engaged, offers a view of that world filled with particular clarity and brilliance. Education has no higher goal than the framing of that view.
"Magnolias don't look like that," Ignatius said, thrusting his cutlass at the offending pastel magnolia. "You ladies need a course in botany. And perhaps geometry, too."

"You don't have to look at our work," an offended voice said from the group, the voice of the lady who had drawn the magnolia in question.

"Yes, I do!" Ignatius screamed. "You ladies need a critic with some taste and decency. Good heavens! Which one of you did this camellia? Speak up. The water in this bowl looks like motor oil."

"Let us alone," a shrill voice said.

"You women had better stop giving teas and brunches and settle down to the business of learning how to draw," Ignatius thundered. "First, you must learn how to handle a brush. I would suggest that you all get together and paint someone's house for a start."

John Kennedy Toole, *A Confederacy of Dunces*
National Conference on the Beginning Design Student (5th: 1985, Albuquerque)

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APRIL 8 & 9, 1988
"TEST DRIVING AN IDEA..."

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I. THEORETICAL BASE

To provide a rational basis for the conception of these courses which we wanted to design we felt it was necessary to begin by defining 'what is learning' and then to organize the construction of our ideas on that understanding.

a. What is Learning

To learn means: "to gain knowledge or understanding of, or skill in, by study, instruction or experience; to come to be able; to come to realize; to come to know, to acquire knowledge or skill or a behavioral tendency." (Webster's Ninth New Collegiate Dictionary)

Learning implies two stages: a previous standpoint where something is not yet known, understood or skilled and a post-stage when that has been achieved. Learning thus the possibility of a mutation, a change. What was inconceivable, inaccessible or impossible becomes graspable, reachable and possible. Applying Piaget's theory of psycho-physical development, we can say that learning is a process of transformation which is carried out by a double process:

1. the student projects their own cognitive/behavioral structures in order to apprehend/act on the object (or problem at hand) by using their existing level of understanding and skills. This is called Assimilation.

2. the subjective projections encounter resistance in the actual object (or problem) and are not sufficient to grasp/act on it within the existing level of psycho-physical development. In this circumstance the student must come to adjust their cognitive/behavioral structures to new ways of dealing with the object (or problem) that is being confronted. This is called Accommodation.
But learning happens not only as a re-action of the student to a presented object/problem but also as a result of inner necessity of subjective expression in the world. In the latter case the student unfolds themselves through expressions which in their realization become constrained by the world and thus they have to accommodate to it. Once these expressions have been extraverted they become part of the environment/object and thus are a new source of challenge which in turn the student has to learn responses for, and thus the process unfolds back again.  

Consequently, (in both cases, the act of learning, as in any human experience, is basically a product of interaction between the student and their environment, and therefore it always involves a dialectic process between accommodation and assimilation - the two always present and active archetypical psycho-physical functions - which, in its struggle, brings adaptation. Learning is therefore an experience which challenges the students prejudices and knowledge because it calls for a response based on intellectual or practical skills which are not within their possession. This means that the experience of learning cannot be fulfilled within the parameters of the subjective conditions alone that are brought to the situation. In this way, we can further say that learning takes place when the forces of accommodation take the lead so that a development of the assimilative potency of the subject is achieved, and thus an evolution in the levels of understanding occur due to a change in attitude, volition, knowledge and/or skills.

From this perspective, one also understands some of the difficulties of the learning/teaching process. In effect, since to learn means to change existing structures of dealing with the world, it implies effort, certain levels of anxiety before the unknown, and short periods of painful re-structuring of existing subjective patterns and a loss of security. Learning always implies growth, excitement and advancement, but also short regressions, stress, insecurity and uneasiness. Potentially all experience can involve learning but actually not all experience causes learning in a student. For learning to occur it is necessary not only that challenge be present in the environment but that this challenge be recognized as such by the student. This means that the student can understand/feel the situation as calling for their participation. From this, two conclusions become clear:

1. the learning experience should present a challenge to the student at a level admissible to their understanding/skills and in a manner that causes a positive volitional attitude; and
2. the student should be open to accept and respond to the challenge.

Both conditions should be present in order to have a successful learning experience. For without the subject's openness and participation even the best facilitating context would fail; and without a right environment the learning experience would become impoverished or worse, a negative input. Learning is a self-feeding experience once it has been activated, and it builds up into a hermeneutic paradigmatic structure (its dialectics) until the challenge, the object/problem has been seized/solved.

b. Conclusions

Therefore if we want to truly educate/train a person we must change them. This change can take place in many ways and forms; it can be minor or radical, specific or general, but regardless of its characteristic the purpose and nature of Education is to bring about such a change within a person. It is a result produced by an activity, process, or intention, which belong to pedagogical insights and methods.

Our real concern then should be; how to more effectively facilitate this change? It is important to use the term facilitate, rather than make, because, as we saw, the educational change in a person comes from within and is dependent upon the person wanting to change. The questions are therefore :

- How to present information or experiences, in a form that will attract the interest/attention of the person to be educated/trained?
- How to transmit information and experiences so they are useful, memorable, and meaningful?
- What information and experiences to transmit?
II. EXPERIENCE BASE

a. Problems with Teaching

By way of providing an experiential background for the thinking which led to the development of these courses, it is important to mention some things which we have observed in over 25 years of combined experience as a design teachers. The majority of that time is related to Prof. Grebner's involvement with senior level Architecture students in 'Urban Design studios, with the balance divided between us, in teaching basic design courses, (i.e. drawing, color, visual thinking and these courses). During that time we have had a great deal of opportunity to observe the changes that result from the 3 years of Architectural education/training each student undergoes and at the same time, witness the condition of those same students at the beginning of their 'educational' experience (ordeal ?). These students' skills and knowledge in their last year of training, ranges in quality all the way from the astounding to the abysmal, with an average being 'just acceptable'. What is most shocking to see however, is that although there is generally significant improvement in their skills and knowledge, there has been at the same time a dramatic deterioration in their attitude (i.e., enthusiasm for learning).

When you think of the beginning student the one thing that characterizes them from other students is their enthusiasm level (i.e., dreams of glamour and mystery). They of course, also have a very high anxiety level (i.e., entering unknown territory). By the time these same design students are in their last year of study, their anxiety level is still high, although it's source has been transformed from a fear of the unknown to a fear of the known. (This anxiety is generally unrelated to creativity or individual project 'risk taking', because ordinarily there is very little of that going on, it is most often related to workloads, due-dates, and varying ambitions for the 'marks of success').

On the other hand their enthusiasm has all but disappeared, perhaps because the imagined glamour was only a mirage and the mystery only confusion or myth. However, it maybe that we have somehow in the process of educating them 'burned them out', 'crushed' their enthusiasm, and failed to teach them how to love learning, to instill a desire for continuing 'learning as a way of living', to help them maintain that 'child-like' excitement that exemplifies genius and creativity.

If there is one word that most fully describes the typical senior student it would be COMPLIANT.

The qualities that characterize this condition are:
- a tendency to conform
- a lack of enthusiasm and curiosity
- an inability to think along original or even (idiosyncratic) lines with consistency.
- an attitude of 'knowing', rather than 'questioning'.
- a lack of individual motivation and self organization.
- an absence of positive self-criticism.
- an absence of a position from which 'to view the world', to ask questions, to make judgements, to relate information and experiences to context.
- an inability to translate experience or specific circumstances into general principles, to draw conclusions, to hypothesis, to ABSTRACT.
- an inability to admit inner feelings/emotions, and express or expose themselves. It is almost as though something had driven these capacities from them, (could it be the jury system ?)

We do not mean to suggest that all students are guilty of these charges, nor that those who are, are all equally guilty. It should also be noted that these observations may not be shared by all, or for that matter any of our colleagues.

b. Intentions/Principles

To use these observations as the basis for developing an outline of Intentions for a 'beginning design' course it was necessary to invert these criticisms to produce a list of intentions. (When we were doing this we likened the process to the idea of "planning a trip to avoid places, that you don't want pass through."). Therefore rather than re-stating the criticisms, it was a simple matter to just re-state each of them in a positive form and you have a (partial) list of our intentions.

This list then combined with a list (below) of what we referred as Principles would serve as the
basis for our design of the courses.

- Relate the complexity of materials and exercises to the level of student development.
- Present materials sequentially so that they are cumulative in effect.
- Present materials and exercises in plain language. Use the vocabulary of the discipline, but clearly define and point out what is essential and what is 'jargon'.
- Make the course of study enjoyable, but also transmit the conviction that design is an attitude, a life-style, a vocation.
- Avoid being prescriptive in course content, method, technique, or in evaluation.
- Provide a clear, consistent and orderly work environment, and process, to instill the idea of 'personal discipline' as crucial to the process of creativity and professionalism.
- Structure exercises to fit the type of experience/information being transmitted; the range of types should include:
  - Closed: (i.e. many drawing exer.)
  - Open: (i.e. most design exer.)
  - Defined: (i.e. some design and drawing exer.)
- Integrate and link exercises, lectures and experiences as much as possible to convey the sense of wholeness in the 'Design Process'.
- Always work in 'Context', to convey the importance of relationship and effect on the 'Design Process' and product.
- Require the ability to project, generalize and abstract from the 'specific' context. (to conceptualize).

c. Strategies

If these objectives were to be achieved, strategies that were responsive to the different kinds of learning experiences, (to these definitions of learning and to the individual and typical conditions of the recipients - the Students) would be needed. The following are those strategies which we identified and have utilized in different combinations throughout this sequence of courses.

'Shock of the New':
The majority of students prior educational attention has traditionally been directed to the development of the left brain (rational, linear, symbolic, verbal, mathematical). If it is agreed that a primary concern in the education of the designer (Arch., LA, Interior Design, Mech. Engineering) is the necessity for an inventive/inquisitive approach to thinking and decision making, then it is obvious that most students are not prepared by their previous education to do more than learn by rote, to imitate and perform prescribed rituals, such as memorizing, following directions and exam taking. (Our heavy reliance on 'GPA' in the admissions process plays to this and is only one example of how we reward the student who performs well in 'left brain' tasks.)

If a student is to learn to be inventive or creative, (it can be learned), they have to be liberated from the usual patterns, the cognitive 'straight jacket' of linear left brain thinking. It may be best, then, to use a strategy of crisis or 'shock' to catch the students' full attention, by presenting them with situations which cannot be resolved satisfactorily through conventional 'left brain' thinking. The students' ability to survive and the degree of their initial success, would serve two purposes:
- To awaken (without direction) their awareness and respect for the intuitive 'right brain' abilities.
- To measure their previous awareness and abilities in this area.

This strategy was used to teach 'freehand' drawing and several of the design exercises in the Winter and Spring quarters.

'Business as Usual':
The attractiveness of this strategy is that it is easier and more acceptable to build on the intellectual strengths and logical patterns of thought which have already been cultivated in the student. This approach may produce the short term appearance of quality results, provided the exercises are precisely defined and controlled. (Open ended, loosely defined projects will not so easily
The long term disadvantage of this approach occurs when the student is cast into an open ended or undefined situation that requires some individual courage, the ability to risk being wrong, trial and error, lateral, circular, or inverted thinking. The student is then at a disadvantage because even if they are presented with these new possibilities, they are loath to see any advantage or need to switch modes of thinking. We, as teachers, have in this situation, reinforced a belief and confidence in the student's old way of thinking by providing them with carefully devised exercises for which:
- there is a logically, linearly obtainable solution.
- and, which will not only allow, but will almost guarantee success if you follow the linear sequence.

Perhaps we are doing students a disservice, by spending too much time approaching the process of discovery and invention in design, via the left-brained 'ways of thinking', in which they have already been schooled. This strategy was used in Descriptive Geometry, analytical exercises and in 'drafting' training.

*'Primrose Path' (or the Ambush);
A third strategy is a variation or combination of the other two. It initiates the students with a short series of exercises which are based on what they know best (left brain thinking). Then the students are 'ambushed': confronted with the realization that left brain thinking didn't prove successful in dealing with these exercises or they are presented with situations that demand 'right brain' thinking and creative behavior in order to be resolved satisfactorily. When it becomes painfully obvious that they can't succeed with the other methods of thinking, new methods of thinking, (right brain), that have been introduced, may be more easily explained, and developed. This strategy was used heavily in the Fall quarter (see Course Content).

III. COURSE CONTENT

a. General Overview
The curriculum is a 3 course sequence, presented as a paradigmatic unit with its own contents, process and characteristics, which simultaneously, inscribes an overall set of objectives and philosophy for teaching beginning design. This pedagogical philosophy directs the learning process which begins with an intuitive awareness of an issue, then proceeds through a rationalized understanding, to an application in synthesis (design). This sequential process is used in each of the 3 parts of the curriculum. Within this framework, the curriculum emphasizes three topic areas:

ATTITUDE: perceptual and conceptual awareness
SKILLS: thinking and communication
KNOWLEDGE: formal and behavioral elements/principles of design.

The first course (Fall), emphasizes student skills and the development of environmental awareness through a phenomenological approach.

The second course (Winter), proceeds into the abstract domain of pure compositional concerns and a concentration on formal and systematic presentation, the exploration and use of the basic elements/principles of design.

The third course (Spring), returns the abstract realm back into the 'existential world', thus the student undertakes a synthesis of the two realms. A complementary system of major/minor exercises and lectures are used to carry out curriculum intentions.

b. Course Outlines

FALL: * (FEELING) Arch 1071/4 credits
Skills (emphasis: 30%):

Graphic Media: Introduction to the equipment and media of the design professions and their proper application, freehand drawings, general perspective principles, introduction to diagram, systems of measurement (anthropometrics, formal methods, scale, proportions,
Awareness (±30%):
Introduction to the environment and the place of design in it, providing a general scope. Discovery of differences between designed and non-designed products, (allatory or accidental) vs planned intentions. Perceptual analysis of the environment emphasizing the student's own feelings, intuitions or reasons (it should be a personal discovery, rather than directed or instructed).

Methods and Processes (±40%):
Introduction to problem solving as mental processes which combine right and left brain activity. Demonstration and exercises about visual thinking and pure rational thinking. Present design as a way of thinking rather than producing. Terminal exercise for the quarter, synthesize the 3 phases through their application in design: object of utility: tool, toy, furniture.

WINTER:* (UNDERSTANDING) Arch_1072/4 credits
Skills (±30%):
Graphic media: Formal perspective methods (1, 2 and 3 points), paraline drawings (axonometrics, isometrics, etc.), texture, tone and value, light, color, theory, photography, continuation of the development of the skills learned in the first quarter. Verbal media: Focus on quality of the student's spoken and written expression as a way to handle consciously the mental processes, and enhance communication.

Awareness and theory (±30%):
Presentation and exploration of the elements and principles of design in complete isolation:
Study of their syntactics: Architectonics. Observation of the use of these elements and rules in the actual world (Architecture, Artifacts, Landscape). Demonstration that these principles are profoundly rooted in the human nature (Psychological and physiological structures). Geometry, Proportion and Scale as instrument of the designer. Realization of the potentiality of Form to arise and express emotions, ideas, concepts, feelings, etc. Awareness that the manipulation of Form is ultimately supported in certain rationale.

Methods and Processes (±40%):
Design as a construct of a relationship which is supported in intentions. Continuation of the preparation of a theoretical base for visual and rational thinking. Focus on a more conscious objective basis for the designed product by clarifying intentions, goals and results; also the development of autocratic abilities within the student. Development and automatization of a method of design through several problems with different topics but a similar process. Exercises throughout the quarter to get the student acquainted with the importance of the process of thinking/design in the evolution of intentions, awareness and insights of the problem.

SPRING:* (ACTING) Arch_1073/4 credits
Skills (±20%):
Introduction of computer. Utilization of the learned media as a means to develop, explore, evaluate, communicate, express, simulate and document (through sketch and model) ideas and results of the design process.

Awareness and theory (±30%):
Development of theoretical topics throughout the quarter, man and the Physical/Social Environment, their interactions: psychology, culture and society, meaning, human behavior and space, elements of design in this context, form and activity, behavior: activity vs. function, etc. Conceptualization of design as a consequence of human needs rather than an end in itself: purpose/form/perform. To make the student become acquainted with those ethical and philosophical considerations regarding environmental intervention. Student's ability to carry out analytically and critically the gathering and study of the information (programming necessities, existing conditions, requirements, etc.) by testing their true comprehension
an additional benefit of this reduction in lecture load, has been more 'one on one' crit time, which in-turn has allowed us to move away from the 'closed review' with written comments to open reviews' with more student/teacher interaction. this exchange of time spent by the teacher writing out comments for each separate students edification, for a more 'alive' exchange between student/teacher over 'the project' with the other students 'joining-in', has produced not only a more satisfying, but a more memorable and therefore a more educational experience.

IV. EVALUATION

a. Criticisms/Changes:

After our first year of experience, (1986-87) we have made several changes, among which were; moving some content from the Fall (i.e., descriptive geometry), to the Winter and some from the Winter (i.e., color and perspective systems), to the Spring. These changes have provided a more efficient transmission of the needed information, a more effective connection with their use and have freed up more time for other activities. We are still however in the process of refining the color segment and linking it more closely to 'drawing' (i.e., perspective) and the Major Exercises. We have also altered our teaching approach for 'descriptive geometry' from a 'formal' traditional, abstract/conceptual to a more informal, hands-on, practical approach where the concepts, methods and systems are learned while they are being manipulated, rather than explained theoretically, practiced and then applied. The improvements as a result of this change have been very positive.

Our first year experience has indicated that the students had great difficulty in using class time as 'studio' work sessions. This problem is primarily due to the lack of assigned 'studio' space, (i.e., not being able to keep projects in place) so that most students find it practically and psychologically difficult to make the adjustments necessary to using that time as 'productive time'.

We have tried to overcome this difficulty by making adjustments in class structure (i.e., more time for interactive 'self' and 'intra' student criticism), program content (i.e., assignments requiring less moving of 'work materials', more 'freehand' than instrument drawing) and altering attitudes, theirs and ours, by 'psyching up' (i.e., we can do it!). Our original intentions for insuring adequate 'intellectual content' through carefully prepared 'free standing' lectures, proved to be not only very labor intensive in their preparation but they consumed an inordinate amount of class time and proved to be sufficiently boring and problematic (inability to make 'connections') for the student, so that we decided to reduce the length of the lectures, alter their format, so that they would be less time consuming and more integrated with the Major/Minor exercises insuring a better 'linked' information transference.

The Spring of our first year program was intended to synthesize, not only in the sense of 'bringing together' the 'knowledge/skills/attitudes' of the previous quarters work, but as a demonstration of
the 'design process'. As it turned out there were real problems with this in practice. The students almost universally had difficulty in making a transition from the more 'abstract' work of the Winter Quarter, to the academic 'real world' of the Spring.

Almost without exception students forgot or were unable to apply the experiences from previous quarters work without a lot of 'prompting', and even then only with hesitation and uncertainty. This year we have inserted at the beginning of the quarter a 3 part interim series of exercises called 'Explorations'. The purpose for these interconnected exercises is to employ the knowledge, sequence of method/techniques and skills from the preceding quarters to establish an understanding and an 'overview' of the Major exercise (3 part) and to demonstrate on a broader more general and a less intimidating scale (for the student) how this experience and knowledge can be used. This is the hope anyway, we shall see.

b. New Directions
There are of course problems which haven't yet surfaced and some about which there is very little that we can do because they are beyond our control, such as; the continuing need for 'dedicated studio' space, the significant drop in class size (60 to 25) from Fall to Spring quarter. (This is the result of conflicts in scheduling Winter and Spring quarters that cause students to take 5 cr. courses in Calculus and Physics simultaneously). There is hope however that these problems will be resolved within the next few years because of planned changes in the curriculum to eliminate Calculus as a requirement and make 'Beginning Design' a required course. Beside the construction of additional to the SALA building will provide 'dedicated' or least 'assigned' studio space for our courses.

It is anticipated that when the Beginning Design courses become a part of the regular curriculum that this fact alone due to increased enrollments, (50-60 at present, to 200-250), will likely have a significant effect on format and logistics. This, by the way, is an unusual symbiotic opportunity for the SALA Graduate program to provide a channel for the formal training of future educators. (Normally the whole training and practice for an Architectural educator begins with a TA fellowship position or their first job). In this light more thought and effort will need to be directed toward methods of selecting candidates for student teaching positions, for their training (i.e., special course work involving teaching methods, pedagogical theory, etc.) and for evaluating their performances.

So we appear to have come 'full circle', from a discussion of; what is learning, how to teach, and finally, how to prepare others to teach.

V. APPENDIX
a. References


b. Course Bibliography (partial readings list)

*Pattern Language.*

Bachelard G, *Poetics of Space*, 1964


Cullen Gordon; *The Concise Townscape*, Reinhold, New York, 1961


<table>
<thead>
<tr>
<th>WK</th>
<th>LECTURE</th>
<th>MAJOR EXERCISE (MEx)</th>
<th>MINOR EXERCISE (mEx)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRO, outline course content, organization, intentions.</td>
<td>'PLACE/Description'; subjective (uninstructed) description of self-selected place</td>
<td>DRAWING/Benchmark'; drawings by students to show beginning skills. DRAWING/Right Brain'; drawing exercises, contour, 'up-side down', positive/negative.</td>
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<td></td>
<td>'DRAWING/Language'; intentions, as language of design (not as 'art') Draw Right Brain'; discuss brain specialization, techniques for learning to draw.</td>
<td>'PLACE/Analysis'; (A Formal Process) intentional, comprehensive consideration of selected place. Part 1/Approach-methods of Analysis</td>
<td>'DRAWING/Freehand'; outdoor exercises using contour, gesture.</td>
</tr>
<tr>
<td>3</td>
<td>'REALITY/A Human Experience'; Phenomenological viewpoint in the environment, 3d+ movement, to understand its structure, function, method, process. 'DRAWING/as a Tool'; discovering reality through drawing. 'DRAWING/Descriptive-Geometry'; Language of Projection, Orthographic Projection, Basic principles of MONGE projection, point, line, plane.</td>
<td>'PLACE/Analysis'; Part 2/Analysis of content and presentation method.</td>
<td>'DRAWING/freehand'; from objects/slides through abstract basic patterns, to understand forms/shapes. 'DRAWING/Des./Geom. make pattern model of simple geom. solids</td>
</tr>
<tr>
<td>4</td>
<td>'MAN AND MEASURE'; Intro. to Anthropometrics, object-man relationship, discuss scale, measurement, proportion. 'DRAWING/Descriptive Geometry'; Basic principles of MONGE projection, point, line, plane.</td>
<td>'PLACE/Measurement'; using subjective (body), measure selected place, translate to objective (English system), verify w/same system.</td>
<td>'VISUAL THINKING'; puzzles DRAWING/Des./Geom. freehand horiz., vertical projection based on measurements of place.</td>
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<td>Section</td>
<td>Content</td>
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<td><strong>5</strong></td>
<td>'DESIGN/Definition': interface between man and environment. 'PLACE/Model': construct model based on orthographic projections from previous exercise, verify with reality. 'DRAWING/Des. Geom.': exercises 'DRAWING/freehand', contour, gesture of natural objects.</td>
<td></td>
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<tr>
<td><strong>6</strong></td>
<td>'VISUAL THINKING/Problem Solving': 'PLACE/Drawings': Do isometric drawings of model built in previous exercise. 'DRAWING/Freehand': isometric studies for major exercise. 'DRAWING/Des. Geom.': exercises</td>
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<tr>
<td><strong>7</strong></td>
<td>'VISUAL THINKING/Ideation': discuss use of graphics in problem solving. 'PLACE/Cut and Fold': construct model to demonstrate spatial layering, light movement. 'DRAWING/Des. Geom.': exercises</td>
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<tr>
<td><strong>8</strong></td>
<td>'DESIGN/Composition': principles of composition, grouping, movement, balance, etc., Gestalt theory. 'PLACE/Sticks and Stones': 2d composition using finite number of objects found at selected Place, points, lines, planes present in two forms 'xerox' and drawing. 'DRAWING/Des. Geom.': exercises 'DRAWING/freehand': use of drawings to dissect, analyze composition and pattern.</td>
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<tr>
<td><strong>9</strong></td>
<td>'FORM/FUNCTION/Utility vs Aesthetics': Interactive process produces tension which is necessary for good design. 'OBJECT/Personal': design an object of utility for yourself that can be held in one-hand. (select from: clock, tile, container), synthesize quarters experiences.</td>
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<tr>
<td><strong>10</strong></td>
<td>'OBJECT/Personal': (cont.) Final Review</td>
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<tr>
<td>WK</td>
<td>LECTURE</td>
<td>MAJOR EXERCISE (Me)</td>
<td>MINOR EXERCISE (me)</td>
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<tr>
<td>1</td>
<td>INTRO &quot;LIGHT/FORM&quot; discuss visual perception, light, shadow, contrast</td>
<td>'TO SEE OR NOT TO SEE': 2d&amp;3d exercise in studying the limits of perception. B/W or color.</td>
<td>DRAWING/freehand: exercise from natural objects/slides</td>
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<td></td>
<td>'DRAWING/Natural Forms': discuss compositional order and representation in nature.</td>
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<td>2</td>
<td>'VISUAL LANGUAGE/Elements': design elements/principles point, lin, plane, solid, space/form</td>
<td>'ORDER BY RULE': 2d formal composition using given shapes w/ rationalized process</td>
<td>'DRAWING/Freehand': exercises manmade objects using line</td>
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<td>'DRAWING/Manmade Forms': discuss techniques for representing designed objects/space.</td>
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<td>3</td>
<td>'VISUAL LANGUAGE/Principles': Formal Compositional principles, Gestalt.</td>
<td>'GROWTH AND CHANGE': 2d formal composition study using transformational rules.</td>
<td>'DRAWING/freehand': exercises in lettering using different typefaces, composition.</td>
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<td></td>
<td>'DRAWING/Letter Forms': typeface examples, rationale of choice, purpose, size, style character.</td>
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<tr>
<td>4</td>
<td>'VISUAL MESSAGE/Types': Design elements/principles w/explicit and implicit meaning</td>
<td>'LOGOS': (forms w/ a message) 2d composition using assigned message to convey several levels of meaning.</td>
<td>'DRAWING/ Mixed-media': exercise in organizing and formatting varied information types.</td>
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<td></td>
<td>'DRAWING/Presentations': discuss organizing information to communicate effectively.</td>
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<tr>
<td>5</td>
<td>'COLOR/TEXTURE': design elements/principles.</td>
<td>'COLLAGE OF LIFE': 2d subjective expressive composition using color.</td>
<td>'DRAWING/ Color': freehand use color in sketching perspectives dry media.</td>
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<tr>
<td></td>
<td>'DRAWING/Color Spectrum theory, materials, mixing, application.</td>
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<tr>
<td>6</td>
<td>'GEOMETRY': design elements/principles primary to design.</td>
<td>GOLDEN MEANS (?): 2d composition use proportional system to generate.</td>
<td>'DRAWING/Color': wet media prepare 'color bridging' band Tint/Shade.</td>
</tr>
<tr>
<td></td>
<td>'DRAWING/Color Bridging': theory, mixing, strategies.</td>
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</tr>
</tbody>
</table>
| 7 | 'ARCHITECTONIC/Form-
   Space':
   Design elements/principles. |
|---|---|
|   | 'LINE/PLANE IN SPACE':
   3d construction using 'Golden
   Mean' as in previous project
   line, plane and color. |
|   | 'DRAWING/Color Media';
   strategies, problems, intentions. |
|   | 'DRAWING/freehand';
   axonometric using wet or dry
   media |

| 8 | 'STYLE/Form-Substance';
   design elements/principles. |
|---|---|
|   | 'THE CUBE AND BEYOND I'
   3d construction w/ color,
   formal transformation to pro-
   duce new form/space. |
|   | 'DRAWING/Reflections';
   discuss light, shade, shadow,
   reflections in drawing. |
|   | 'DRAWING/freehand';
   Axonometric w/ shade and
   shadow |

| 9 | 'SYNTHESIS/SELLING';
   design elements/principles
   the power of clearly pre-
   sented ideas. |
|---|---|
|   | 'THE CUBE AND BEYOND II'
   Formal 3d transformation of
   form and space(cont.) |
|   | 'DRAWING/Presentation';
   preparation/exploration of
   media and techniques for final
   presentation of Major Exer. |

| 10 | 'THE CUBE AND BEYOND II'
Final Review |
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AN APPROACH TO A FIRST BUILDING DESIGN STUDIO

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This paper describes an evolving approach to a second year (first building scale) design studio taught by the authors at the Tulane University School of Architecture. The organization and content of the studio was the result of previous experience with "typical" attitudes and behavior of students in the first studio course concerned with holistic building design as a whole, and from ongoing observations of student performance and demonstrated capabilities in subsequent design studies.

The following outlines the overall studio objectives and the relationship of projects and project sequence to the achievement of these objectives. Furthermore, the content, activities, successes and failures of a single studio project will be recounted.

There are three pedagogical concerns that govern the studio organization:

1> the fundamental responsibility of the first building design studio is to broaden the range of design and building issues confronted by the student. This is achieved, in part, by working from general concerns to specific proposals (program needs to building design) and from specific elements to general application (construction details as an influence on building form);

2> the development of critical thought is best achieved through insightful analysis and discussion of design alternatives and choices generated by the student.

3> Carefully designed graphic exercises resulting in significant alternative concepts are a necessary part of the studio activities for two reasons: One, it is very difficult for beginning students to generate truly distinct alternatives that can support critical evaluation and, two, there is a need for a greater appreciation of drawing as an integral part of design.
At the School of Architecture at Tulane University, the second year design studio has traditionally been the point at which the fundamentals of building design methodology has been introduced. From the second year on, the desk crit and jury system has been the sole pedagogical device for imparting content and directing the student's design process. Generally dissatisfied with the traditional design studio and in particular suspicious of it as an environment for real learning by students still at the beginning of their design education, we are attempting to re-organize and redirect our approach towards the teaching of the design studio and are experimenting with several pedagogical techniques.

Our approach was influenced not only by experiences with our own students but also by observations of student work in subsequent design studios. At the third year level in particular, students still seem to have difficulty in organizing information in coherent, manageable hierarchical groupings and in handling the multiple intentions of complex programs. Design proposals tend to be heavy image-based and exclusive of significant programmatic and technological requirements. Students pick those issues they prefer (or know how) to satisfy and try to ignore the remainder. Technical naiveté is evident, not only in the absence of sophisticated technological knowledge but more in the lack of a fundamental appreciation for technology. Students simply avoid confronting the material aspects of building. While increasing facility with drawing and image-related design issues are clearly evident, comparable development of an inclusive design methodology seems to be lagging.

Observations on the Second Year Student:
Students entering second year exhibit a set of typical characteristics. First year has given them a basic set of graphic skills and a fundamental conceptual vocabulary with which they are quite comfortable. They are confident in their ability to design "real" buildings. However, they also possess a nebulous notion of how to perform "architecturally". Not yet familiar with the broad range of issues to be addressed in the building design process, the students tend to rely upon the graphic imitation of projects seen in the professional periodicals or by "skimming" from their favorite architect without an understanding of how the work was generated. Of primary concern is that in looking for all-encompassing ideas that will result in perfect solutions, students are reluctant to commit anything to paper that doesn't have the graphic pizzazz of a finished proposal. The difficulties are further compounded when complexity of form is highly valued in both the initial concept and in the final product and not understood to be the result of forces influencing the design through its development.

In addition, first year has prepared them for quick leaps from project beginning to end, both in concept and time. First year projects are usually one to three weeks in duration and proceed very quickly from the development of an initial proposal to its execution in drawing or model presentation. Interest and enthusiasm is kept high through projects of singular focus, in contrast to second year where extended critical evaluation and development is part of the schedule. A frequent student malaise in second year is a sudden self-perceived lack of interest and involvement in the project at about mid-point when the design concept has been established but is not yet developed enough to start the final presentation charrette. Some students begin to lose momentum and withdraw while others become extremely self-critical of their work, starting over again and again in an attempt to regain the rush of the initial insight. Progressive development of an idea is confused with starting over when the initial idea does not seem perfect in all respects. A conflict is created between a need for action at a time when objective critical evaluation is desired. Simply stated, many of the students do not have the ability or intellectual discipline to sustain interest over the extended course of a project.

A related characteristic is a tendency to react rather than initiate. Unless specifically set into action by an assignment or, as the project proceeds, a desk review, little development of the design will result; what movement does occur is typically the repetition of the same minor variations of the fundamental idea. A brief period of intense activity may occur immediately after a review or discussion with the studio instructor which then rapidly declines until the
student is wound up again. In this respect, the traditional design studio setting and its curriculum organization consisting of project assignment, individual desk crits and final review, contributes to the problem. Typically, at any one time, one or two students are receiving individual attention from the studio instructor/s, a few others are still energized from the recently completed desk review, and the remainder are impatiently waiting for the next crit, or worse yet, have disengaged from their work, drifting away entirely. A major share of the studio period is devoted to a wide variety of activities by the students, many of which have little to do with the enterprise at hand. The tendency is for students to be over-reliant on the instructor for verification of each step before proceeding on to the next one. Worse yet is the desire for verification of an idea before committing it to paper.

The desk critique itself as a pedagogical device is less than successful at the beginning student level. For a crit to be meaningful it must be a substantive discussion of the architectural merits in a student's proposal. However, at this level many students do not have the expertise to initiate a substantial proposal. Crits then are reduced to mini-lectures by the instructor on design fundamentals, which the instructor will repeat again and again as he/she moves down the row. Students are often left to draw up the discussion and await the next crit. The results are rather similar and conventional solutions to the design problem and are more a indicator of the instructor's mood and enthusiasm than an exploration of architectural thought by the student. The desk crit alternates between hand holding and hand slapping...

Studio Objectives

Studio objectives were developed in response to these observations of student ability and performance. The fundamental assumption that guides the development of the course content is that at a beginning design level breadth of exposure to knowledge, procedures, and methodologies is more appropriate and useful than proficiency and false mastery of any particular aspect of the overall design process. Through no fault of their own the students are simply unaware of the range of issues that have to be addressed in architectural design. Furthermore, oblivious to these questions, they tend to concentrate on image at the expense of program, material or tectonics and substitute a graphic complexity for developed design proposals. The first intention of this studio is to widen the range of issues to be confronted in design, even at the expense of the complete, co-ordinated design proposal, in preparation for greater depth at the third-fifth years.

Second year is seen as a closely directed sequence of activities leading to the generation of architectural proposals for the purposes of critical evaluation and discussion. The objectives of the first building design studio have been organized under four broad categories:

Site: A real place with understandable and informative conditions which include contextual relationships, spatial and functional questions of urban form.

Program: consisting of user needs, patterns of activity, spatial organization, and architectural form generated by activity and use.

Architectonics: which introduces a concern for materials, technological support systems, and construction, the influence of these on form and their relationship to architectural intentions.

Form: Conceptual structure vs appearance of order; form vs image. A three dimensional manifestation of the issues of site, program and architectonics.

Each studio project addresses these broad areas although individual projects are designed to emphasize a particular category:

A small elementary school project on a rural site included studies of spatial organization through the analysis of precedents, introducing the generic concept of typologies, specific types of spatial organization and the use of precedents as a design tool.

A small factory project, discussed in detail below, focused on form as derived by a manufacturing process (program) and issues of materials, technological integration, and building construction.
The current project in the studio, a public library, again addresses the various library processes as form determinants, but also concentrates on qualities of interior space.

An intention of the particular studio assignments is to initially equalize the students with varying degrees of experience and skill. While the "typical" student profile has been described, there are extremes of student capabilities which can often undermine the studio environment -- ideally a place of shared learning through individual effort. Weak students require an inordinate amount of attention which still does not compensate for their undeveloped graphic skills. Above average students either receive less attention because of their strengths, coasting through the project, or receive an inordinate amount of critical attention in response to the relative success of their work. Neither situation is appropriate when the intention is to promote a broadly based discussion of architectural principles across the studio. To establish a common datum every student needs to produce work that (a) looks pretty much the same as everybody else's and (b) with enough architectural content to support a critical stance. Another intention is to promote the generation of a broad range of alternative design concepts and proposals. It is difficult for beginning students to generate true alternative solutions to design problems that support critical evaluation. Any initial concept acceptable to the student becomes too precious for the student to see with critical objectivity, inhibiting the investigation of other possibilities. Typically, the mandate to develop alternatives as part of the project requirements results in the student's repetition of the same assumptions that led to the initial, and often weak, first conceptual proposal, or in perfunctorily created filler, camouflaging the "real" idea, which is then presented as an alternative but without serious intent.

The intention of the sketch exercises is to generate alternative proposals that are not to produce all the possible solutions but rather two or three intelligent choices that respond to the exigencies of the problem. It is important that these are developed by the student, not by the instructor during a desk review. Only in this way can the student critically evaluate his/her own work according to the project criteria.

Narrowing choices to a few significant ones for each student throughout the design process leads to clearer understanding of the fundamental principles, less confusion on the student's part and greater assimilation of the relevant information. A distinction between two clear concepts provides the basis for a critical comparison of qualities and success of each. Especially for the less mature student, the clarity resolves some of the many ambiguities of the design studio and fosters the development of a critical thought process.

Project Description:
The most recently completed project in the studio was for the design of a new manufacturing facility for a frozen yogurt chain headquartered in New Orleans.

The project and building type was introduced through the analysis of precedents. Prior to issuing detailed project information, slides were used to illustrate significant aspects of industrial building design. In particular the relationship of building form to the industrial process, functional zoning, structural planning, and construction materials were shown. In addition daylighting was an important focus of this project and, in fact, had suggested the selection of the factory as a building type. All second year students were concurrently enrolled in a required technology course which addressed daylighting. That we expected their technical understanding of daylighting to inform their design intentions was made very explicit.

The students were also required to select major structural components/materials and enclosure systems from the precedent analysis to be used in their own proposals. From the very early stages of the design, the choice and use of materials was a discussion issue. Students were allowed to modify their material choice but the question of materiality was developed concurrent with spatial and formal qualities. A collection of readings on the factory as a twentieth century building type (Banham, Le Corbusier, Salvadori) was also assigned.

Students were issued a project description modeled on an existing facility which briefly described the manufacturing process and the requirements for the physical plant. A field trip to the existing factory enabled students to
see the facility in operation and document the manufacturing procedure in detail.

The class also made a trip to the site which they extensively documented in slides. As both a graphic exercise and for visual reference, students were required to make large drawings of the site by tracing the projected slides in detail. These drawings were displayed in the studio space and provided a continual reference to the site context. They were also used as base drawings for the final design presentation. Issues of responsibility to the larger urban context as well as the specific formal implications of the site (corner of two major arterials, adjacent industrial and residential, etc.) were discussed as a group.

Shortly after the trip a definitive program was developed and the manufacturing process diagrammed by the class again as a group. A discussion of formal implications particularly spatial organizing typologies (a focus of an earlier project) grew out of the programming process. Various organizational strategies were identified and evaluated. In these group sessions principles of analysis and critical thought were introduced.

Following a brief period of individual design work, the class was assigned an in-studio project that became known as "blind model building". Prior to the class, the students were instructed to bring a selection of model making materials that were supplemented in class by additional diverse, scavenged materials. They were given forty-five minutes to fabricate a kit of building parts. Each kit contained four elements: a roof system, a floor system, vertical supports, and a space enclosure. Variations on the basic four parts were allowed. Later in the afternoon they were allowed to make additional copies of their parts as required. Then, temporarily putting aside the model parts, a 10 minute blind contour drawing of their plan was assigned. The drawing was to contain as much detail as possible.

The blind drawings grew out of weekly graphic sessions. Originally intended as pure drawing practice, the life and feel of the blind drawings (draw outline of object/s without looking at the page) that the students made during these sessions suggested their use as a design tool. While very loose and highly distorted, blind drawings typically are highly legible and convey a stronger sense of graphic intention and visual understanding than the rather clumsy, stilted drawings of most beginning students. The lack of precision has been an advantage because the notational character of the information lends itself to alternative interpretations.

Rather than building a model of their own building with the kit of parts, as the students assumed, the drawings were collected and randomly redistributed. They then became the basis for the construction of a model with the kit of parts. At the end of the period, each student had interpreted someone else's plan and designed a building using his/her building parts. For each student essentially three alternatives were created: one, a new drawing of their own building through the blind exercise; two, an alternative interpretation of their plan in model by another student; and three, a building designed through the interpretation of an inherited plan with their own kit of parts.

Four objectives had been accomplished: the generation of distinct alternative proposals; the use of drawings in a notational and exploratory sense; the use of study models as an early design tool; and confrontation of building structure and construction as a design issue. Generally, the models that were built were more exuberant and exploratory conceptual proposals than in prior projects. The lack of risk to the ego by having had no responsibility for the plan drawing they were working with and the interpretations they were forced to make of the drawing seems to have had a liberating influence.

The discussions that followed between the originator and interpreter of the plan drawing concerning the reading and execution of the plan intentions, while not anticipated, furthered the objective of critical dialogue.

In subsequent weeks, similar blind contour drawings of building sections and elevations were made, again as a way of using imprecise, notational drawings as design tools. The drawings and models were used as the basis for discussion and it was not until after this stage that we began talking with students on an
individual basis. As students continued to work, other documentation was added to their collection, and we limited discussion to ideas that had been drawn instead of tentative ideas they were thinking about developing.

The next requirement was a small structural framing model which was used for discussions of the relationship between structure, function of spaces and building form. We did not expect a sophisticated understanding of structure, but rather common-sense and intuitive insights supported by the precedent analysis and assigned readings. The model, however inaccurate, supported a discussion of structure and form that was based on a proposal developed by the student. Additional freehand drawings of construction and connection details at full scale assigned during the same time period further reinforced the project objectives. This occurred about halfway through the project schedule.

The next stage was the construction of a larger scale, bas relief (a thin slice mounted to a backing board) sectional model through the entire building, constructed of accurate model pieces representing the actual constructional component. Abstraction of the model was specifically discouraged. Spatial enclosure, daylighting strategies, and conceptual integration of mechanical systems were shown.

With these constructional models, the approach to the design process had been intentionally reversed. At the beginning of the project "large" general issues of urban form, resolution of programmatic requirements and spatial qualities were the points of departure for the design process. With the focus narrowed to construction and details, very "small" scale and specific influences on building form could be examined. The sometimes endless cycle of insignificant plan and elevation revisions that students see as design development was avoided. Students discovered how a specific design component, such as a skylight detail, could inform the design process in a much larger context, such as at the scale of the site. For many students, this model resulted in a conceptual breakthrough and was the highpoint of the project. The number of building elements to work with because of the requirement for detail, expanded their design vocabulary. Seeing a part of the building at a larger scale allowed them to make design judgements that are not possible at typical drawing or model scale.

After the section model the class was allowed to develop their design and prepare plan, section and perspective presentation drawings and a small site massing model or axonometric. By design there was not enough time left to redo the entire project. A few significant drawings were redone and revisions to the earlier drawings and models were handled through supplementary drawings or overlays. All the significant artifacts of the process were presented at the final review: blind drawings, structural models, etc. The result was not a complete, coordinated design proposal but an assemblage of distinct views of a building design at several scales and vantage.

This overall picture of the design process supported a more sophisticated final project review than typical in second year. The discussion, which included outside critics, ranged over the entire breadth of design issues. Critics and students alike focused predominantly on the quality of the architectural thought rather than the refinement of the execution, which we feel to be appropriate at this level and a conscious objective of the studio organization.

**Scheduling**

The project has been described above in a more or less linear sequence. However, in reality, there were always at least two tasks assigned and on going at any time. By overlapping start and due dates for assignments some of the lag time between the completion of one task and starting the next was eliminated. Students often began to think ahead to the next activity while completing the current one, often alternating between activities as their insight or enthusiasm varied.

Very little of the studio time was left to the students to schedule for themselves. Frequently, graphic assignments were made and completed in the same class period, or at latest by the next meeting. The work habits and design techniques of second year students are not sufficiently developed for them to make efficient use of studio time without close supervision.
Evaluation

Conclusions are difficult to draw at this point. We have only begun to redefine, for ourselves, the nature of the design studio and are experimenting with some teaching techniques. We hope that the substantial benefit will occur in subsequent years in the student's education. However, we do have the following observations.

Successes:

- The range of issues and the breadth of experience made it possible for each student to present a project which they understood in depth and which sustained a substantive discussion at the end of seven weeks. Under the probing of the reviewers, the students proved that they understood what they were presenting, including the technological information.

- Substituting a variety of techniques and tactics for a linear design approach enabled each student to participate in a critical evaluation of real alternatives which they had developed.

- By emphasizing process over product the greatest distinction in student performance was between those who worked and those who didn't, rather than between levels of "ability". Those students who had expected to make up for a lack of effort and discipline with a tour de force performance at the end were unsuccessful and presented obviously incomplete projects in comparison to the other students. Grading was also simplified. Issues of effort, attendance, and discipline became secondary concerns; evidence of growth, process and learning were quite evident in the projects themselves.

- The students themselves, in post-project discussions, professed a high level of satisfaction with both the studio method and their individual results.

Concerns:

Of course, there were variations in the results of some of the methods and in the work of the students. Refinements of the studio objectives and ways of achieving them are evolving. The following, in particular, are of concern at this point:

- Not all students were able to suspend disbelief of the studio methods. Our ideas of studio organization and particularly of final "product" ran contrary to already deeply fixed notions of architectural design.

- Two seemingly paradoxical conditions arose common to students at the extremes; both the least capable and most mature students were uncomfortable with the lack of a "complete", coordinated set of drawings and models as a final product and in general with the overall project conduct. Both student types were concerned with their lack of complete authority over their projects. The weaker student seemingly out of frustration with not being able to stick with their first idea, laboriously developing it, in a clear, linear progression; and the more capable student unhappy without the opportunity to fully develop the building to its envisioned potential. The former students felt that they had not received enough attention, the latter felt they had received too much.

- It was difficult to tailor the studio content to the individual needs of students. Although we gained a sense of each student's capabilities, it was a great deal more difficult to modify the assignments and the evaluations to the special needs of each student than it would have been in a less structured studio situation.

- In a sense, by fragmenting the design process with the various graphic and modeling tasks, we are providing a smorgasbord of design techniques at least some of which we hope are useful to the student in the future. However, we are questioning whether the lessons learned are useful in a broad context. By purposely avoiding a specific "this is the way to design buildings" approach, have the students been prepared to function without the structure of this studio?
National Conference on the Beginning Design Student (5th : 1985, Albuquerque)

5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT

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APRIL 8 & 9, 1988
This essay is divided into three parts. First, a presentation of the theoretical background for a studio science is given. Second, one manifestation of the process is discussed and described in detail. Third, examples of projects from that exercise are shown.

The source of form-giving, the primary responsibility of the architect, and the forces that drive a particular formal response to a three-dimensional problem are the crux of design. Frequently students generate seeds of form from ill-understood interpretations of what is appropriate found in architectural periodicals and other vicarious experiences. While many of these approaches hold some validity, they are limited. In the project presented, the primary goal is to engender in students the idea that the forces that work on a particular three-dimensional design problem can be the primary generator of form. An approach I have developed called Formal Pyramids is used as a catalyst to this end. Four form-driving forces are identified at the outset of this experiment and the students are asked to generate three more. The goal of the experiment is to show students of design that responsive, spatial arithmetic can grow from clear understandings of the forces at work in a given context.
Architectural education, particularly studio education as it is conventionally practiced today, is at odds with the careful and considered generation of knowledge prevalent in most academic fields. In all phases of academic endeavor, the generation of new thought and new ideas about a set of subject matter is the primary goal of the discipline. Too often in studio education we make an effort to teach everything at the same time. Generally considered a vocational approach to learning, studios of the future should do all they can to eliminate that approach.

There are three levels or approaches to science which order themselves chronologically. The first level, the way science was practiced by the Greeks, was pure and very abstract. A set of axioms or self-evident truths were developed and a system of thought that was consistent with these axioms, and therefore itself, followed. This is pure and applicable to numerous aspects of architectural design. We encourage students frequently to do just this through the development of the CONCEPT and the testing of every facet of the building against this concept in a way which will make the building self-consistent.

The second level of science, one that is occasionally practiced in architectural studios, first occurred during the Renaissance. It had nothing to do with axioms or beginning with truth, but rather with conclusions built on a set of observations. The examples of this through history are numerous - the swinging lamps at the cathedral in Pisa with which Galileo began his series of pendulum studies comes to mind.

The third level of science, presently the basis for the generation of knowledge in almost every discipline, is totally different and recognized as having more knowledge generating power than either of the previous two. It involves the phenomenon of the experiment. The experiment, as conventionally defined, is a theatrical setting of some kind through which the experimenter maintains as complete control as possible over most of the variables and lets one variable or force float. The experiment creates a private world in the laboratory which generates knowledge regarding a causal relationship between a set of forces and all other reality is excluded.

In attempts to do this, I have used design projects in which the students are asked to design a small part of a building and concern themselves only with the form and order of the part. The criticism from peers is that the student never gets a chance to put the whole thing together. My retort is that even when they have the whole building project, the students never really put the whole thing together. They never talk to the banker, the planning and zoning officials, the client's new husband, the priest, the doctor or the building inspector. In most cases, when we talk about the whole building, we are talking only about the whole thing as an iconic model of reality. Architectural truth, like truth in any discipline, is subjective. It is the scientists' best observations about causal relationships between things and ideas which can be used over and over again through their professional lives. It is a system for generating this that we need to inculcate in the students from the beginning to the end of their architectural education.

WHAT IS AN EXPERIMENT IN ARCHITECTURE

In physics we would like to answer the question: At what rate does something fall? We then begin a process whereby we define each term of our question, the structure of a
hypothesis positing an answer, advising a setting which produces some resultant, measurable, and causal connection between our hypothesis and the outcome of our experiment. Someone who has a novice's understanding of physics would say the question has a simple answer: 32 ft/sec^2. This is not true though. Very few things fall at precisely that rate. This is so because distribution of mass, air content, and a host of other factors affects the rate at which something falls. Clearly, if we started measuring the rates at which things fall it would not surprise me if after 100 measurements only one or two objects fell at the physics rate of speed. Physics is not real. It is a model of reality that exists in a kind of vacuum called a laboratory. However, the principles about the rate at which something falls applies to every falling object. The physicists structure experiments in a way which allow them to generalize an answer to a very complex problem and call it a law.\textsuperscript{5}

I am not sure that this basis exists in architectural studios. At best, there is some first and second level science. The job of the teacher should be to allow and help the student of architecture to generate architectural truth in the same sense the physicist generates physical laws through experiment.

**THE STUDIO PRODUCT**

The product of each project in every college of architecture should be a testable idea which is clearly communicated, that has to do with the nature of building. It could, and as a set should, deal with any number of issues that relate to the making of buildings. It could revolve around budget, energy, beauty, function, structure, construction, details, color, sense of place, sense of well-being, meaning, image, user needs, client contact, iconic communication, verbal communication, mathematical communication, the relationship between acoustics and light, proportion, composition, rhythm, balance, sequence, shades and shadows, heating and cooling, natural ventilation, edges, nodes, paths, zoning, geometry, order, and connection. The point here is that I am proposing a method of teaching which fractures architectural process and architectural issues into the smallest possible parts and looks at each in a scientific fashion, in a way that verifies ideas generally so they may be applied to many contextually specific situations over and over again.\textsuperscript{6}

I would argue for an approach that generates context-free architectural truth. We set up a theater in which the students operate on an architectural problem, and generate a solution and a conclusion about it. We ask the students to fracture their thinking about architecture and focus on a single set of issues which would lend themselves to reusability, and generate fragments of architectural thought that can be carried from context to context. Too many times in the studio the fragments which people carry with them are fragments about how to communicate an architectural idea, and little is formalized regarding the ideas they communicate. It is frustrating for me to ask students on the first day of class to tell me something about architecture, and have them unable to respond. It is as if architecture can only exist in a particular place, at a particular time, with particular materials, and a particular site, with a particular client, and a particular program. It is as if there is nothing about the business which we conduct that is transferable apart from some specific reality. This should frighten all of us. We all know that it is not true. What we struggle with is the way in which this thinking about space and the ideas or truths about architecture can be treated as scientific principles that can be applied over and over again.

**MEASUREMENT**

Measurement that would occur in the kind of architectural science that I am talking about
is different from the kind of measurement that occurs in most science today. The precision of measure has actually begun to replace the importance of measure. We have generally accepted science as a precise inquiry, with things observed and scaled to five decimal places, and hundredths of a percent, when in fact this has little to do with our science, and much to do with our technology. The measurement for the kinds of architectural experiment which I am presenting here will be much broader (sometimes responding to the idea of consensus), but nonetheless valid, science. Probably the single aspect of contemporary science that has held our discipline away from science is the mistaken notion of precise measure as the measure of science. Science can be excellent and approximate at the same time. The measurement does not make the science.

THE STUDIO PRODUCT OF THE FUTURE

The studio product should manifest itself this way. First, it should be the product of an intense, but very short experiment, perhaps no more than two weeks long. It should state a hypothesis about three-dimensional space at any scale from a detail in a piece of furniture, to the plan of a city. It should be truthful in the sense that given a certain set of conditions it would repeat itself. It should be stated in a way that someone else can look at it and understand the intent and the outcome of the experiment which was conducted to test the idea. A student at the end of their formal academic training should have an assembly of these ideas and truths that make up their body of architectural knowledge. No experiment should ever address formally more than one or two aspects of spatial reality. They should be highly constructed and focused. It will make teaching more demanding.

THE LIMITATION OF EXPERIMENT

Experiment as is being discussed here is very limited, the results of the experiment very abstract in application. Just as it is possible that no object falls at the rate of 32 ft/sec\(^2\), no architectural truth will be applicable to a real situation in a way which allows a direct manifestation or reoccurrence of that truth. This is where the approach begins to be both problematic and enticing at the same time. The approach that I am forwarding creates general knowledge which must be applied to the particular three-dimensional problem that is being wrestled with. This is the point in the problem where the truth begins to be situational and the idea of spiritual understanding, which is not measurable, enters the equation.

This same phenomenon expresses itself clearly if we look at the way we have approached epistemology throughout history.\(^7\) Things we can understand are relegated to the category of material knowledge, science; and things we cannot understand are relegated to the category of the metaphysical, the miraculous: God. Through time, in most traditional systems of knowledge generation, the material part has grown while the spiritual part has diminished. We attribute less today to God than we did one hundred years ago. In general, the uninformed observer might think this would dictate that spiritual understanding is now less important in many disciplines. The acquisition of material knowledge about things somehow depletes the relevance of spiritual understanding about our relationship to the world. This does not appear to be the case though.\(^8\) The grains of spiritual understanding that the physicist deals with today are just as important as the mountains of spiritual understanding with which Galileo dealt. In other words, although the proportions have changed, the importance of both in any science is not dismissed.

My goal as an educator is to shrink the numbers of spiritual considerations, through the materialization of large numbers of architectural truths, but at the same time increase
the importance of the fewer number of spiritual considerations that do occur. Thus, if the sum of the equation was One a thousand years ago, the sum is still One today. In other words, if the answer to the whole problem is spiritual understanding and material knowledge, the same equation still holds. The fears we have about materializing architecture to a point where there is no spirit left are misplaced. We are incapable of it.

NOTES

1. I have summarized the general points here and attempted to structure a relationship between the sciences and architecture.


2. Poincare's observations about the experiment and its relationship to the study of geometry is important. These experiments are not the same as the kind which we normally associate with science. They tend towards the generation of knowledge through intellectual construct. This kind of experiment is prevalent in twentieth century science, but difficult to find in earlier work.


3. Ziman, in his discussion of objectivity and doubt, uses the relationship of a map to the real experience of the place. The relationship is one of consonance when the map is well-executed, but it, the map, is free from the trappings of the real place.


4. Settle, in a selection in this volume, gives an account of the limits of universal application to scientific truth and the temporary nature of much of what we call rational, but cannot forward another working hypothesis for it. Even discussions of intersubjectivity do not solve this fundamental problem.


5. This point is made most clearly by looking at the opposite position. That being that scientific truth is discoverable in a way which will never change, and only become more precise.


6. This fracturing of architectural knowledge into discernable pieces closely parallels the philosophers' approach to Epistemology.


7. Ibid

8. A more complete discussion relating to the notion of two realms of understanding is available in Rabinowitch's discussion.

FORMAL PYRAMIDS

ONE MANIFESTATION
PART TWO

THE PLACE OF THE PROGRAM IN THE CURRICULUM

The exhibited work is the project of a series of seven that occurred in the first semester of third year design in a four year pre-professional program in architecture. The course is a six credit hour, twelve contact hour studio constituting 40% of the student's academic load.

THE EDUCATIONAL GOALS OF THE PROJECT

The goal of almost every student and of design faculty at the outset of a project, is to encourage, animate, incite and otherwise affect in student work an "interesting" response to the project presented. The operative word here is "interesting." What it means, how it relates to beauty, function, composition and execution are all salient components of the process. In contrast the goal of this experiment is to show students that "interesting" design can grow from a rigorous look at the forces operating on a particular design environment. An intense look at the forces that might shape the design is encouraged as a way to generate "interesting" formal responses to three-dimensional problems.

THE TEACHING STRATEGY FOR REALIZING THESE GOALS

The composition of this problem makes it easy for students to understand the issues effecting three-dimensional form, unencumbered with what a form "ought to be," and based on what the form "must be" in order to achieve the desired result. The desired result comes from two directions simultaneously. First, the student is asked to respond to four forces that affect the form and order of a small living environment. These are: ergonomics, natural light, natural ventilation and emotion. The first three of these forces are supposed to be considered independently of what the student "wants" the living unit to be. The last force - emotion - is supposed to address the issue: Given that these three forces are considered in this context, the resultant form is as shown. This is what the living unit "must be" to satisfy the forces; and now, when I consider the emotive aspects of the living unit, this is what I think it "should be" like.

These four considerations are developed around a set of three considerations identified by the student. One portion of the program comes from the client (problem) and the second portion comes from the designer (student). The intent is to demonstrate to the students that there are many agendas which drive the form of the building; some are client-generated and some are designer-generated, neither more important than the other, both significant in the form-giving process. The forces generated by the client are considered in what I call a Formal Pyramid. This pyramid is constructed like this: For ergonomics, what are the minimum volumes which will house the activities required for this 15,000 cu. ft. living unit? What will the structure look like if only the minimum spaces are built in accordance with the problem statements that are designer-generated? Secondly, given the three problem statements (program) the student has written and the four forces, if the minimum spatial enclosure must be responsive to natural light, how must it be mutated to be sensitive to the light requirements? Thirdly, given this set of criteria again, how must the form and order of the unit be mutated to allow for proper ventilation as determined by need and the designer program? Lastly, how do I want this living unit to look? How do I want it to be given the fact it must look like this to satisfy ergonomic requirements, this to satisfy ergonomic and light requirements, this to
satisfy ergonomic requirements and light requirements, and ventilation requirements? And finally, how do I want it to look knowing that it must look like this to satisfy all of the requirements of the program? This process leads to the following pyramid of forces.

Ergonomics = Form 1
Ergonomics + Light = Form 2
Ergonomics + Light + Ventilation = Form 3
Ergonomics + Light + Ventilation + Emotion = Form 4

The strategy is to allow the form to generate itself with the student only responding to the forces at work on the three-dimensional space. It is important in this process that the student make every attempt to consider only the forces being looked at. The lesson is that "interesting" form may be generated solely with a thorough understanding of the form-driving issues which are at work in a particular design environment, and that it is not necessary to try to make something "interesting" - it will happen if it is responsive to the stuff effecting it. This is my estimation of the most valuable three-dimensional design lesson a student can learn. It is independent of style.

MEANS FOR ASSESSING THE STUDENT WORK

The work is assessed on a number of criteria. I have listed these below.

1. Is the living unit minimal in its spatial consumption?
2. Is the light the kind needed and defined by you for the given activities?
3. Is the ventilation the kind needed and defined by you for the given activities?
4. Is each of these incorporated in the living unit when you consider the emotive forces?
5. Is the mutation of the form positive? For example, are you holding on to what is important from each step of the pyramid and not mutating out the salient three-dimensional character-istics that drive the form.
6. Is it clear you can communicate written and graphic ideas to a designer?
FORMAL PYRAMIDS

EXAMPLES OF WORK
PART THREE
ERGONOMICS

COCOON
SHELTER

LIGHT
A studio which uses design drawing and iterative feedback

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Abstract

This paper describes a beginning design studio which uses design drawing and iterative feedback to sensitize students to the qualities of physical designs and to how those qualities affect other peoples' feelings. Students are sensitized to the qualities of physical designs by drawing scaled perspective sketches of those designs. Students are sensitized to other peoples' feelings by using explicit measures of pleasure, arousal, and dominance as the criteria for feedback and evaluation. Because the evaluation was done several times for the same criteria, the students could use the feedback from previous design cycles to improve subsequent versions of the designs. Because the evaluation was done through a scientific paradigm, it was possible to determine if there were changes in the students' abilities to express feelings through physical design and in their abilities to understand the feelings of other people. The results support the hypothesis that there were significant improvements in both abilities.
A Studio which uses Design Drawing and Iterative Feedback

Drawing

The word "draw" has a long history and many meanings. It occupies over six full pages of the Oxford English Dictionary. The first OED citation under "draw" is dated 1200 A.D. There are 89 different definitions listed, most of which have several variants. For instance, "draw" mean "to cause to come forth or issue, to elicit, 'fetch', call forth, evoke" (definition No. 46). A person can "draw" a feeling from the unconscious to awareness. "Draw" can also mean "to deduce, infer (a conclusion, etc., from premises" (definition No. 48). In this meaning, a person can "Draw a conclusion based on thoughts". "Draw" can mean "to elicit information from (a person)" (definition No. 53). In this usage, a person can "Draw out a client's wishes". Finally, in terms of graphics, there are definitions about "delineation or construction by drawing". Of particular relevance are definitions Number 59 and 60, which read "To trace (a line or figure) by drawing a pencil, pen, or the like, across a surface", and "To make (a picture or representation of an object) by drawing lines; to design, to trace out, delineate..."

Just as the word "draw" has had many variants, the medium of drawing has had many variants (1). There is a great variety of drawing types even within the limited field of architectural drawing (2). Architectural drawings have ranged all the way from impressionistic sketches such as those found in the notebooks of Le Corbusier (3) to the elaborate, ink and wash elevations of the Ecole des Beaux Arts (4). In between, there are bubble diagrams, yellow-flimsy 6B sketches, axonometrics, rendered elevations, perspective sketches, full-blown paintings or colored renderings, working drawings, shop drawings, and, undoubtedly, many other types of drawings, not to mention computer simulations and video.

Given such a vast assortment of possible media, it is difficult to isolate one type of drawing and advocate its use for teaching beginning design students. However, we can obtain some guidance if we first inquire as to the possible purposes of architectural drawings. For example, the purpose of a working drawing is to show the contractor where to put the materials that make up a building. The purpose of a shop drawing is to tell the architect what the subcontractor thought the working drawings meant. One of the purposes of a competition drawing is to stand out among hundreds of competing drawings. What, then, should be the purpose of drawings in teaching design?

I submit that the purpose of drawings for teaching design should be a direct exemplification of the purpose of education per se. Not being terribly modest, I also offer the following conception of education per se: education should be a process which shows students how to cultivate their own potential abilities as fully as possible. More specifically, the process of education should show students how to refine their thinking, feeling, perception and imagination. Moreover, students should learn to be aware of how their own personal thoughts,
feelings, perceptions and fantasies differ from the thoughts, feelings, perceptions and fantasies of other people. Education should teach students how to "draw" themselves out. I ask that, for the duration of this paper, we accept this statement of personal ability and education without discussion (5).

Given the above statement of education, the purpose of drawings for teaching design should be to encourage design students to become more aware of thoughts, feelings, perceptions, and fantasies. One form of drawing which seems to be particularly appropriate to the purpose of education per se is William Lockhard's "Design Drawing" (6). As explained by Lockhard himself:

"As design drawing, drawing should be tentative and exploratory, inviting change and including the context and the user. The drawings are of no value except as a means of externalizing and evaluating a tentative design proposal. They should be informally, but essentially, accurate and should have a careful, if abstract relation to the design process, and a direct relation to reality...They should be a transparent viewer through which designers can see what they are designing. The most valuable design drawings are those which extend and shape the design process and accurately represent the experiential qualities of the design. (7)

Lockhard (8) proposes one series of drawing techniques which address these objectives. Some of his steps are based on differences among rendering techniques (line drawings, tone drawings, tone of line drawing, line and tone drawings, black and white on middle tone, diazo reproduction). Some of his steps are based on peoples' interest in different visual components (spatial interest and structure, tonal interest and light, textural interest, and additional interest).

The drawing steps used in the present work differ from Lockhard's steps. Instead of focusing on rendering techniques or visual interest, the present work emphasizes the decisions required to create a work of architecture. First we have the decision to use architecture as the medium of choice. In selecting architecture we limit our solutions to the organization of material in three dimensional space. Second, for any specific work of architecture, choices will be made regarding the form, scale, and materials which comprise the work itself. Third, choices will be made regarding how the work will affect our sensory abilities: light and heat are the typical examples; examples of smell and touch could be found, particularly for handicapped designs. Fourth, choices will be made regarding how the work affects our mental abilities; our feelings while we are in the space, the associations (personal or cultural) that a work symbolizes, how we infer proper social behavior from the architecture, and so on.

I use the phrase "choices will be made" quite intentionally. Any work of architecture will have all these consequences. The only
question is whether the consequences will be created on purpose or will be accidental.

Clearly it is not possible to explore all these ideas in a beginning studio. Some selection must be made. The simplest case is to concentration on the visual aspects of the environment, and the simplest set of conditions required to describe the visual properties of a work of architecture appears to be form, scale, materials, and light. These qualities can all be represented through perspective overlays. The base drawing is a measured perspective grid. This ensures allegiance to three dimensional reality. The first overlay shows outlined forms. The second overlay shows people, furniture, plants, and other components that fix the scale of the scene. The third overlay shows the materials, and the fourth shows the lighting scheme. The overall results are perhaps more closely related to the style of drawings developed by Michael Doyle (9) than the style of Lockhard, because Doyle emphasizes color and materials instead of line and interest.

It is assumed that a perspective drawing is the most cost-effective method for representing the experiential qualities of the physical environment. The actual accuracies of the various presentation media is still a matter of discussion in the academic literature, but there is some evidence that people's responses to visual simulations (especially color slides) tend to predict 80% of their on-site responses to environments (10), that the use of color is important (11), that responses to simple perspective line drawings are related to responses to slides (12), and that responses to computer-generated line drawings are not related to responses to slides (13).

In view of the above conditions, it was decided to employ a variant of Lockhard's "design drawing" as the medium of choice. The specific variant used involves the following steps: (1) start with a measured perspective grid, (2) outline forms, (3) outline scale-fixing components, (4) indicate materials and light through texture and color. The mere process of having to draw these qualities sensitizes students by forcing conscious decisions about the forms, scale, materials and light that comprise the visual aspects of a proposed environment. Drawing "externalizes" design proposals by drawing the proposals out of the unconscious into tangible existence.

Iterative Feedback

The value of a design drawing is to externalize and evaluate a tentative design proposal. Externalization is achieved through a color perspective sketch. How, then, might the sketches be evaluated?

The evaluation method used in this class was explicit, iterative feedback. This is a highly analytic model in which design problems are conceived in terms of how well preconceived means can achieve preconceived ends. While not appropriate in many situations, the simple ends/means concept of design can be a very helpful learning process. In order to use the ends/means model, several things are required,
including (a) selection of ends, (b) selection of means, (c) a measure of performance, (d) iteration, and (e) explicit feedback.

Once architecture is selected as the medium of solution, the allowable means are limited to the arrangement of physical material in three dimensional space. There are many possible ends for architecture, and, again, selection is necessary but difficult. Again, some guidance can be found if we revert to the purposes of education per se; teaching students how to cultivate their own thought, feeling, perception, and imagination and to understand the thoughts, feelings, perceptions and fantasies of other people. One way in which design drawing can be used to address these purposes is to have each student record what he or she thinks, feels, sees, or associates with his or her own design drawing; have other people do the same, and then compare the differences.

Again, this is a fairly tall order for a beginning student. The evaluation can be much easier if the evaluation criteria are more limited. In this class, the evaluation criteria were limited to the feelings people thought they would have if they were in the designed environments. The selection of feelings as the evaluation criteria was partly a matter of professional importance and partly a matter of expediency. The professional importance is based on the simple fact that environments affect peoples' feelings. There appears to be a curious reluctance on the part of environmental researchers to accept this simple fact, but anyone who has taken a vacation knows perfectly well that the physical amenities of an environment can cause pleasure or excitement. Anyone who has visited a Gothic Cathedral or the Grand Canyon knows perfectly well that environments can make people feel magnificent. In this class, it was simply assumed that peoples' feelings were a worthy design determinant.

Selecting feelings as the evaluation criterion was expedient because there is a simple way of estimating how intense feelings are. The method is semantic differential scaling for three feelings: pleasure, arousal, and dominance. Pleasure, as the OED has it, is "The condition of consciousness or sensation induced by the enjoyment or anticipation of what is felt or viewed as good or desirable; enjoyment, delight, gratification." Arousal is the feeling of excitement. Dominance is the feeling of power. These three feelings are useful because if you can measure the intensities of these three feelings, you measure between 50 and 80% of the intensities of feelings in general. The original empirical work in this field dates back to 1957 (14). Since then it has been extended to many different cultures and different languages (15). The work most relevant to designers was done by Mehrabian and Russell (16), who developed a simple pencil-and-paper response form which measures the degree of pleasure, arousal, and dominance of which a person is aware. The measurement is done with 18 pairs of adjectives. Six pairs measure pleasure, six pairs measure arousal, and six pairs measure dominance. By using the scales developed by Mehrabian and Russell we can get a reasonable estimate of the intensities of feelings a person has in an environment. For brevity, use of pleasure, arousal and dominance as the system for representing feelings was called the "PAD Theory".
In this class, these estimates of feelings were used for three different purposes. First, use of the PAD theory forced the students to become aware of their own feelings. It is one thing to say "I feel"; it is quite another to try to identify intensities of eighteen different ratings. The mere exercise of writing down one's consciousness of feelings forces attention on those feelings; writing something down is just as much a type of expression as drawing is. For example, the first class assignment was to find and draw environments in which the student felt happy, sad, interested, bored, powerful, and weak. Judging from their initial reactions, most of the students had never even considered what kinds of different feelings they had, much less how the physical environment might affect those feelings. The mere act of making explicit recordings of the intensities of one's feelings forces recognition of feelings right up to consciousness. The act of making an explicit recording can evoke - or "draw forth" - feelings, and thereby achieves one of the purposes of education.

Second, because the intensities of feelings can be recorded in the PAD theory, it was possible to have designers predict how other people would react to design drawings; to have other people record how they did react to design drawings, and, because under the PAD theory, the intensities of feelings can be measured, it was possible to compare the designers' predictions with the actual responses. In other words, the differences between the designers' predictions and other peoples' responses are a measure of performance. If we have such a measure of performance, we will be able to tell how much consensus or dissensus there is in peoples' feelings about any particular environment. Such is the importance of being explicit. So long as feelings are allowed to remain buried in individual privacy, we will never be able to tell if we agree or disagree with each other. In other words, the PAD theory can be used to "draw out" other people's about their feelings. Moreover, learning the differences between one's own feelings and the feelings of other people achieves another aim of education per se.

Third, the PAD evaluations were done not once, not twice, but three times for the same design project. Not only was the feedback explicit, it was iterative. Consequently, if the designers' first predictions did not match the other peoples' responses, the designers had two more chances to modify either their predictions or their designs to achieve the intended effects. Most of the student chose to modify their designs; if other people thought the project was too boring, the designers added more detail, more jagged lines, more color contrast, etc., to make it more interesting. There is a rather substantial scientific literature on how to make images more or less arousing (17), so students who needed guidance in modifying their projects could find possible solutions in the library. There is less empirical work available on how to achieve the feeling of dominance through design variables, so the students generally used their own personal experiences to generate possible modifications. For example, if other people thought the design was too weak, the designers typically added more mass or increased the size or height. Using iterative feedback forced the students to become aware of how manipulation of specific design components could affect the intensities of other peoples' feelings. By consciously changing physical design components to cause specific
feelings, the students learned how to think of design in terms of ends and means. The students could begin to "draw conclusions" between design decisions and the effects of those decisions. Consequently, another requirement of education was addressed: learning to think.

To summarize: the selection of means for this class followed directly from the selection of architecture as the medium of solution; the allowable means are arrangements of physical material in habitable space. The goals were selected as peoples' feelings. The measure of performance was the difference between the designers' intended PAD ratings and the other peoples' PAD ratings. The evaluation was performed three times, so there were three iterative design cycles. Finally, all feedback was written down and made explicit.

The Process

The logistics of this class were complicated but not insurmountable. The class was partly a lecture class, with lectures on the PAD theory, on design drawing, and on the design of churches. There were required readings. The works of Mehrabian and Russell, Lockhard, and Doyle were featured. The class was partly a studio class: there was one assignment to draw existing environments and three assignments to design a small church. The class was also partly an experiment; instead of having architectural juries, all evaluation was done through PAD ratings. There were twenty basic steps. These steps are shown in the flow chart in Figure 1. Steps A, G and L were lectures, supported by required readings.

Steps B through E were necessary to see how well the students could draw and if they understood enough about pleasure, arousal and dominance to use those feelings as design goals. The basic assignment (Step B) was to find and draw environments in which the student felt happy, sad, interested, dull, dominant or submissive. Examples of some of the sketches are shown in Figure 2. These drawings were made by student "Mark". Figure 2A was supposed to convey an impression of submissiveness, while Figure 2B was supposed to convey an impression of interest. At evaluation time, all the sketches were put on the walls of a room and each student attempted to guess which drawing was supposed to convey which mood. The percentage of correct matches between the drawing and the moods varied. The mood of dominance was matched with 80% of the correct drawings. The figures were lower for happiness (72%), sadness (65%), interest (55%), dullness (56%), and submissiveness (35%). This assignment provided the students with practice in judging feelings. It also indicated that, in spite of the fact that the students claimed they knew architectural drawing, some additional lectures on design drawing would be needed.

Step F is about the only aspect of this class that is found in a typical design studio. In this step, the students were given a plot plan, an aerial photograph of the site, an architectural program listing the functions, areas, and adjacency matrix of a small, non-denominational church, and instructions to go visit the site in question and draw up a site analysis. Since these procedures are well known to
architectural teachers, no further details will be presented in this paper.

Steps H through K are the first design cycle. The students worked mostly with site plans and floor plans. Most deferred the design drawings until the last minute, and some students did not do design drawings for the first presentation at all. My own observations suggested that the students still thought of the design drawings as a gloss to be added to the presentation after the design was done, rather than as an integral part of the design process. That preconception was obliterated in the first review. In the first review each student was supposed to submit three design drawings. One drawing was supposed to show the main facade of the church; one was supposed to show the lobby, and one was supposed to show the worship hall. After all the sketches were put on the walls, each design drawing sketch was rated according to the 18 semantic differential scales developed by Mehrabian and Russell. There were two kinds of ratings: one in which the designer rated his or her own work, and one in which the other students rated the work. The purposes of the two kinds of ratings were slightly different; if a student was rating his own work, he or she attempted to predict how the other students would rate the work. These were called "self" judgments; they were the designers' predictions about how other people would react to the designer's drawing. If the student was rating someone else's work, then the task was to imagine what it would be like to be in the environment shown in the sketch, and to record what feelings the environment would elicit. These were the "op" judgments (for "other people"). The instructions used in the reviews were as follows:

1. Imagine yourself standing in front of each perspective drawing (main facade, lobby, and worship hall).
2. If the project is not yours, write down how you would feel in each space.
3. If the project is yours, write down how you wanted people to feel in each space.

Grades were based on the differences between a student's predictions and other peoples' responses. The more accurately a student could anticipate those responses, the higher the grade. Students who put most of their effort into the site and floor plans discovered that those efforts were wasted: the grading was not based on the plans. Students who did not do the design drawings could not be graded at all; they were given a "D" and were strongly encouraged to follow instructions in the next design cycle. The encouragement worked quite well; in subsequent reviews everyone somehow managed to get all the design drawings done on time. After the review, all the responses were tabulated by computer and returned to the students. For the first review, the feedback consisted of the P, A and D values as predicted by the designer, the average P, A, and D values as given by all the other students, and a list of the best and worst features of each project. These lists tended to be quite idiosyncratic - each feature was listed by only one or two people - so the lists were not particularly useful as guides for improving the designs.
Table 1 shows the feedback for a design similar to the sketch shown in Figure 3A. (The original drawing was lost, but this sketch is a fairly accurate replication of the original.) This design was again done by "Mark". At the top of Table 1 there is a section called "PAD Ratings". It can be seen that the designer rated his drawing as being more pleasant, much more interesting, and less dominant than the other people rated the drawing. From these numbers the student concluded, correctly, that in order to get a better grade next time, he had better make the building "read" more "interesting" to other people. The verbal commentary was more difficult to interpret since all of the comments were idiosyncratic. Because most of the verbal comments were not useful, they were not solicited in subsequent reviews.

The second and third design cycles were repeats of the first cycle. The second cycle was Steps M through P; the third cycle was Steps Q through T. The feedback differed slightly. Since the "best and worst" feature lists did not appear to generate useful feedback, the second design review (Step O) asked for lists of the forms, scale, materials and lighting that a person either predicted or noticed in a sketch. This feedback was intended to reinforce the emphasis on the components of physical design. Grades were still based on the divergence between predicted and actual feelings. Table 2 shows the feedback for the second review for Mark's drawing. This time the design was changed to include a Post-Modern screen, which Mark thought would increase peoples' pleasure ratings. As can be seen from the feedback, such was not the case. The verbal commentary was more structured, and, in most cases, a little more useful. Mark predicted that people would notice triangles, stucco, and wood, but only two students listed triangles as a major form. The other students noticed the wood and stucco, but also noticed glass and tile roofs. Mark used this information to produce the next version of his project as shown in Figure 3B. Because the feedback indicated that the triangles were ineffective, Mark took the triangles out of the final version of the design. By making this change, Mark demonstrated that he was becoming more sensitive to the effects of physical design components. In other words, Mark began to change specific components of the physical design in order to change how other people would respond to that design.

Since design process ended before the final review (step T), only evaluation criteria were collected. The PAD ratings of the design drawings were used for 30% of the course grade. For example the final ratings for Mark's drawing were as follows:

<table>
<thead>
<tr>
<th>Source</th>
<th>Pleasure</th>
<th>Arousal</th>
<th>Dominance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Ratings</td>
<td>1.5</td>
<td>.83</td>
<td>.50</td>
</tr>
<tr>
<td>Other Peoples' Ratings</td>
<td>1.1</td>
<td>.45</td>
<td>.47</td>
</tr>
</tbody>
</table>

Table 3. Final Review: Mark, Main Facade
It can be seen that there is much more congruence between Mark's predictions and other peoples' responses for this version of the facade. The other people liked this facade more than they liked the previous versions, and Mark adjusted his estimates of arousal (downwards) and his estimates of dominance (upwards) to match the feelings of other people. By changing his predictions about his own work, Mark demonstrated that he was becoming more sensitive to other peoples' feelings.

Figures 4A and 4B show examples by another student ("Sam"). The PAD responses for Figure 4A are shown in Table 4:

<table>
<thead>
<tr>
<th>Source</th>
<th>Pleasure</th>
<th>Arousal</th>
<th>Dominance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Ratings</td>
<td>1.6</td>
<td>1.3</td>
<td>1.83</td>
</tr>
<tr>
<td>Other Peoples' Ratings</td>
<td>.87</td>
<td>.50</td>
<td>.56</td>
</tr>
</tbody>
</table>

Table 4. PAD Feedback, Final Review: Sam, Lobby, Figure 4A.

It is obvious that, for this drawing, there was a substantial difference between the designers' predictions and the responses of other people. Inspection of the verbal commentary indicated that the other students listed the form as being "rectangular", and it was suggested that the designer change the ceiling form to be more exciting. In addition, the designer listed only two materials (stone and redwood), but the other people tended to list the carpet. The reason for listing the carpet was that Sam had used a scarlet air brush ink on the carpet, and the saturated color stood out from the other students' more subdued pencil colors. In the final version of the worship hall (Figure 4B) both the exciting ceiling and the red carpet were retained, plus a considerable amount of textural detail and a larger space. As a result of these design modifications, other peoples' responses tended to be what the designer predicted, as can be seen in Table 5.

<table>
<thead>
<tr>
<th>Source</th>
<th>Pleasure</th>
<th>Arousal</th>
<th>Dominance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Ratings</td>
<td>1.3</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Other Peoples' Ratings</td>
<td>1.3</td>
<td>1.3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 5. PAD feedback, Final Review: Sam, Worship Hall, Figure 4B

Some Generalizations:

Although the design drawing studio was primarily a class, all the evaluation was done through an experimental paradigm. Consequently the evaluation data can be analyzed as if it were an experiment (18). For instance, in the final review, the students were asked to rank order all the projects based on all submitted drawings (site plan, floor plan, elevations, and sections). Compilation of these holistic rankings
provided an estimate of how well ratings of feelings about design drawings compared with overall holistic impressions of normal architectural presentations. The data indicated a correlation of .86 between the holistic rankings and the scaled preference ratings. While not certainly not conclusive in and of itself, this finding does support the validity of judging design quality through scaling of drawings of parts of a building.

The data also can be analyzed to address the question of whether the whole group of students were better able to express feelings through physical designs after the class. Figure 5A shows the average rated P, A, and D for the projects at the first review and at the second review. The latter projects were judged to be more intense on all three scales. Again, this finding is not conclusive without more formalized replication, but it does support the hypothesis that the final designs were more expressive than the initial designs.

Finally, the data can be analyzed to see if there was an increase in the students' ability to predict other peoples' responses to projects. Figure 5B shows the relevant data. The points in Figure 5B are actually measures of discrepancy between the predicted response and the actual responses, so what was measured was a decrease in discrepancies. This double negative is equivalent to an increase in consensus, so Figure 5B shows that there was an increase in the students' ability to predict other peoples' feelings about design drawings.

Retrospect and Prospect:

In application, this class is concerned with drawing sketches of environments, using a measured perspective grid and a series of overlays, and using semantic scaling as iterative feedback. The class is structured, rigorous, and does not deal with many important aspects of architecture. But the evidence supports the idea that the class does what it was supposed to do: sensitize students to the qualities of physical design and how those qualities affect feelings.

In theory, this work is concerned with drawing: drawing as in making pictures, drawing as in drawing conclusions, drawing as in drawing up feelings from the unconscious and giving them expression as the arrangement of physical materials in habitable space, drawing as in drawing out feelings from other people. This work is also concerned with education; education as the process of showing people how to draw out their own innate abilities of thinking, feeling, sensing, and imagination and how to understand the abilities of others.

In the future, this work could be expanded and refined by conducting similar classes with different students, different programs, and different goals. The class might attempt a collective amusement park, in which each student designs an environment which supports a specific mood. Researchers might make more specific inquiries about what physical design configurations tend to elicit which feelings, for
which groups of people, for what tasks. Someone might be interested in the symbolic connotations of a design; in which case the feedback would consist of matching intended connotations with actual ones.

And perhaps, in the distant future, the methods of experimental inquiry might become part and parcel of the normal design process?
REFERENCES


5. The notion that education should have something to do with cultivating character was taken from Russell, B., (1961). "The Aims of Education". In: Russell, B., *The Basic Writings of Bertrand Russell*. New York: Simon and Schuster, pages 413 - 429. The notion that character is composed of thought, feeling, sensation and intuition was taken from Jung, C., (1976). *Psychological Types*. Princeton: Princeton University Press. (Jung scholars please note that I used "imagination" instead of "intuition". The change in designation was intentional.)


7. Lockhard, *Design Drawing*, pg. 3


13. Ibid.


18. There is not enough space in this article to show the analysis, but all results based on the scaling are significant at least the .001 level.

CAPTIONS FOR FIGURES AND TABLES

Figure 1. Flow Chart of Class. This class was a combination of lectures (Steps A,G,L), studio work (Steps B,C,H,I,M,J,Q,R), and experiment (Steps D,K, and T).

Figure 2. Initial Drawing Ability. These drawings were done in Step B of the flow chart shown in Figure 1. Figure 2A was supposed to convey a feeling of submissiveness. Figure 2B was supposed to convey a feeling of interestingness.

Figure 3. Final Drawing Ability. These drawings are line versions of colored design drawings done by the student who did the drawings in Figure 2. Drawing 3A shows his church at Step N. Drawing 3B shows the church at Step R.

Table 1. Feedback from First Review. This is the feedback of Step J for an early version of the church shown in Figure 3.

Table 2. Feedback from Second Review. This is the feedback for the church shown in Figure 3A.

Figure 4. Lobby and Worship Hall. These are line versions of colored design drawings done by another student.

Figure 5. Changes in average feelings and degree of consensus. These graphs are based on average values for all the students and all the drawings. Figure 5A shows that the intensities of feelings elicited by the design drawings were greater at the end of the class. Figure 5B shows that the discrepancies between the designers' predictions and other peoples' responses were smaller at the end of the class.
### Midterm Feedback: Mark

<table>
<thead>
<tr>
<th>PAD Ratings:</th>
<th>Pleasure</th>
<th>Arousal</th>
<th>Dominance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Ratings</td>
<td>0.5</td>
<td>1.5</td>
<td>-0.8</td>
</tr>
<tr>
<td>Other Peoples' Ratings</td>
<td>0.2</td>
<td>-0.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Verbal Feedback:

#### Best Features
- Homelike, mysterious
- Separation of church and rest
- Color
- Hidden door

#### Worst Features
- Church not dominant
- Too boxlike
- Plain entry
- Location of door to entry

#### As listed by Designer:
- Church not dominant
- Too boxlike
- Plain entry
- Location of door to entry

#### As listed by other students:
- West facade
- Has very little interest
- Roofs don't help look kind of low key
- Too much hall space
- Lettering
- Hard to determine scale
- Fenestration
- Weak integration of features
- Front face of church
- Different exterior materials
- Too much circulation space
- Worship room

<table>
<thead>
<tr>
<th>Best Features</th>
<th>Worst Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homelike, mysterious</td>
<td>Church not dominant</td>
</tr>
<tr>
<td>Separation of church and rest</td>
<td>Too boxlike</td>
</tr>
<tr>
<td>Color</td>
<td>Plain entry</td>
</tr>
<tr>
<td>Hidden door</td>
<td>Location of door to entry</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Front facade is interesting</td>
<td>West facade</td>
</tr>
<tr>
<td>Simple approach to problem</td>
<td>Has very little interest</td>
</tr>
<tr>
<td>Location of room beside worship</td>
<td>Roofs don't help look kind of low key</td>
</tr>
<tr>
<td>hall</td>
<td></td>
</tr>
<tr>
<td>Service entry</td>
<td>Too much hall space</td>
</tr>
<tr>
<td>Low chroma colors</td>
<td>Lettering</td>
</tr>
<tr>
<td>Shadows read nicely</td>
<td>Hard to determine scale</td>
</tr>
<tr>
<td>Some features do not read well</td>
<td>Fenestration</td>
</tr>
<tr>
<td></td>
<td>Weak integration of features</td>
</tr>
<tr>
<td></td>
<td>Front face of church</td>
</tr>
<tr>
<td>Very nice</td>
<td>Different exterior materials</td>
</tr>
<tr>
<td>Stepping down roof</td>
<td></td>
</tr>
<tr>
<td>Interior of worship hall is</td>
<td></td>
</tr>
<tr>
<td>too simple</td>
<td></td>
</tr>
<tr>
<td>Location of building</td>
<td></td>
</tr>
<tr>
<td>Well organized</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 1.**
Second Review Feedback: Mark

<table>
<thead>
<tr>
<th>PAD Ratings:</th>
<th>Pleasure</th>
<th>Arousal</th>
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</thead>
<tbody>
<tr>
<td>Self Ratings</td>
<td>1.0</td>
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<td>-.5</td>
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<tr>
<td>Other Peoples' Ratings</td>
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<td>.2</td>
<td>.0</td>
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</table>

Verbal Feedback

<table>
<thead>
<tr>
<th>Forms</th>
<th>Height</th>
<th>Width</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>As Listed by Designer:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triangles</td>
<td>30'</td>
<td>140'</td>
<td>Stucco  Wood Siding</td>
</tr>
<tr>
<td>As Listed by other students:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadrangle</td>
<td>100'</td>
<td>200'</td>
<td>Shingles  Wood  Glass</td>
</tr>
<tr>
<td>Triangle</td>
<td>20'</td>
<td>45'</td>
<td>Stucco  Shingles  Plaster  Tile Roof</td>
</tr>
<tr>
<td>Cube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharp angular forms</td>
<td>40'</td>
<td>80'</td>
<td>Wood  Stucco  Paint</td>
</tr>
<tr>
<td>Jagged Planes</td>
<td>30'</td>
<td>30'</td>
<td>Wood  Shingles  Stucco  Glass</td>
</tr>
<tr>
<td>Staggered angles</td>
<td>50'</td>
<td>100'</td>
<td>Shingles  Stucco  Glass</td>
</tr>
<tr>
<td>Wedges</td>
<td>24'</td>
<td>60'</td>
<td>Wood  Stucco  Glass</td>
</tr>
<tr>
<td>Rectangles</td>
<td>50'</td>
<td>90'</td>
<td>Stucco  Glass  Tile  Wood</td>
</tr>
<tr>
<td>Triangles</td>
<td>30'</td>
<td>30'</td>
<td></td>
</tr>
<tr>
<td>Box</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectangular</td>
<td>25'</td>
<td>90'</td>
<td>Stucco  Glass  Wood</td>
</tr>
<tr>
<td>Rectangular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shed Roof</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygons</td>
<td>30'</td>
<td>40'</td>
<td>Stucco  Stucco  Wood Siding  Glass</td>
</tr>
<tr>
<td></td>
<td>42'</td>
<td>60'</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2.**
5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT
University of New Mexico/School of Architecture and Planning  2414 Central Avenue S.E., Albuquerque, New Mexico 87106  505/277-2903

Offered through the Research Office for Novice Design Education, LSU, College of Art and Design, School of Architecture.

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SEP 17 1990

APRIL 8 & 9, 1988

National Conference on the Beginning Design Student (5th: 1988, Albuquerque)
INTRODUCTION

Architectural educators are generally eager to incorporate computers into studio teaching as early in the curriculum as possible. Pressure from students and the profession, as well as a justifiable fascination with these seductive new tools, has caused many to experiment with CAD for the novice designer. In spite of the substantial investment of financial and human resources required, a computer-integrated architectural curriculum has become a top priority for most schools.

It is difficult to establish the ideal computer-aided design studio. Grants of hardware and software from commercial producers provide the basis for most initial experiments. This heavy reliance on products which are intended for professional use is inevitable, but regrettable. Although it is getting easier to use, most commercially available design software presumes design skills and a working understanding of computer operation. A beginning design student is usually unable to make the distinction between learning to design and simply learning to use a new tool, and consequently can do neither very well.

I think the ideal computer-aided design studio is one in which learning to design takes priority over learning to use the tool. To be practical, this means that the students need to have some prior exposure to the hardware and software systems being used. This will probably always be the case if professional tools continue to be the standard choice. So what does this mean for the beginning student? What exactly is it that the computer should aid? What is the appropriate use for computer technology in the beginning studio?

I have tried to find answers to these questions by exploring a different approach to the educational use of computers in beginning studios. I am planning to use the computer as an active instructional device, not as a passive representation tool. My current project involves the development of basic design "courseware." My supporting research in computer-assisted learning (CAL) has been cross-disciplinary. Design educators have yet to capitalize on recent developments in CAL. This paper will share my experiences developing educational software for beginning design students and will discuss potential applications of CAL in design education.
BACKGROUND

In 1986, the Architecture Department at Iowa State University revised its curriculum. The basic design studio syllabus was rewritten to include content from the substantive areas of history, human behavior, and building technology. While the focus remains on visual studies, the broadly-based nature of architectural design is acknowledged. I was responsible for developing and teaching this new studio. It occurred to me that it might be wise to offer an introduction to computer use.

I developed a simple pattern-making exercise using the ornamental principles described in Thomas Beeby's article, "The Grammar of Ornament/Ornament as Grammar" and Paul Laseau's Graphic Thinking for Architects and Designers. I gave the students a handout which walked them through a few carefully chosen AutoCad commands and then set them loose in the computer lab. Only one student in the class had ever used a computer before. They were given three studio sessions to complete the assignment which asked them to generate a component and create two different ornamental systems with it. The results were fairly good but I had a few disappointments:

- Students got lost in the menus and could not "stay on task." This meant that they often went outside the bounds of the assignment.

- I had no way of keeping track of what moves they made and most of them couldn't remember them either.

- It wasn't as easy as I thought it would be for them to do many iterations of the exercise. I had expected this to be the major advantage of doing this exercise on the computer.

This exercise seemed perfect for the computer. However, while the experiment did give each of the students a quick exposure to AutoCad, as medium for teaching basic principles, AutoCad was no improvement over the traditional cut and paste method. What they needed was design software with some built-in supports:

- Explicit instructions.

- Immediate feedback and hints.

- Motivating examples and procedural models.

- A way of keeping track of what they had done.

It occurred to me that, given the right software, the computer might be an excellent tool for teaching basic design principles. It did not take me long to find out that no such software existed.
Since beginning my own programming efforts, I have uncovered other similar projects. At the University of Oregon, two software packages for the Apple Macintosh are being developed, one for teaching color theory and another for teaching basic energy conservation principles. Brown and Novitski's "Energy Scheming" creates a computer environment that can be utilized by designers at any level of expertise on a hardware system that is inherently "user friendly." Their software design offers a sketching environment similar to yellow tracing paper, energy performance analysis at any phase of the design process, and "learning labs" which give direct instruction in energy conservation principles. Another, somewhat different approach has been proposed by James Anderson and colleagues at the University of Illinois Urbana/Champaign. Drawing on experiences with the University of Illinois's mainframe computer-based instruction system (PLATO), they are developing software for computer-delivered instruction of fundamental design principles. They are especially interested in exploiting what they call "computer imagination" to enhance traditional drill and practice routines.

Although there are a variety of "courseware" projects underway at various schools, there is none yet available through academic software clearinghouses like Kinko's or Conduit. More design educators need to become involved in writing instructional software. While it may be valuable to train students in the use of professional CAD tools, it is shortsighted to stop there. Design educators need to take a more critical look at computer technology for its potential to support the studio objective, learning to design.

"LEARNING TO DESIGN, DESIGNING TO LEARN"

The title of this section is the title of an essay from a recent issue of Machine-Mediated Learning. The issue is devoted to articles by recent Fund for the Improvement of Postsecondary Education (FIPSE) grant winners whose projects deal with computer-assisted learning in various disciplines. The one other common thread in these projects is an underlying concern with "designing" as a "core discipline for every educated person." The articles range from "A Design Approach to Science" and "The Design of Algorithms" to "Writing as a Design Discipline" and "Restructuring the Curriculum for Design: Music, Mathematics, and Psychology." Most of the projects create computer environments which provide tools, feedback and tutorial supports which help students both to experiment with designing and also to become aware of their own design strategies.

Computer-assisted learning has been around for many years. Significant courseware improvements have followed research findings in cognitive psychology and technological advances. Most good CAL now bears little resemblance to the early behaviorist drills. Balestri and Ehrmann discuss this difference in the work of Nils
Peterson, et.al., "A Design Approach to Science: Simulated Laboratories, Learning Via the Construction of Meaning":

They wanted their students to learn to be designers of experiments and theories, rather than learning theories that could then be applied only by role and "rules."¹⁰

Of "MENDEL: An Intelligent Computer Tutoring System for Genetics Problem-Solving, Conjecturing, and Understanding" by Michael Streibel, et.al. they write:

MENDEL will unobtrusively support students as they develop personal theories of experimental design that go beyond the expert tutor's rules...

The simulated laboratory allows students to design sequences of experiments in order to test hypotheses about the genes of a population of organisms...[The] lab, by itself, provides no instruction on how to create such experiments. This teaching dilemma faces all who teach designing:

- offer too little instruction and students have no idea of what to do; but
- offer too much or the wrong type of instruction and students will merely learn to mimic the surface features of master design techniques, without ever really understanding ideas and data which rationalize those procedures.¹¹

Donald Schon has called what design teachers do "coaching artistry."¹² He has written of the pressing need for design academics to examine and more clearly articulate what and how we teach. Certainly, the development of computer environments for design education provides the occasion for careful study of design pedagogy, if not of the design process itself.

COURSEWARE DEVELOPMENT AT ISU

At the moment, I am writing computer tutorials in the Digital Authoring Language (DAL). The tutorials will be published on the university's Vax-based Courseware Authoring System (CAS) and made available through the Clearinghouse, a national exchange network for educator-developed software. The tutorials teach specific basic visual design principles. The pedagogical premise for each of the lessons is that "learning to design and learning to perceive are deeply intertwined."¹³ The topics I have chosen to start with are well-defined bits of "normative information"¹⁴ like proportion, rhythm, symmetry, hierarchy, etc. These tutorials will eventually form a database, an interactive "electronic textbook," that a student may access at any time.
The tutorials have fairly traditional rule-based instructional strategies. The general structure is as follows:

- Explanation and demonstration of the rule(s).
- Identification of the rule in context.
- Exercises which test for replication and application of the rule.
- Unstructured design problems which allow for experimental application of the rule, and bending or breaking the rule.

For example, the proportion tutorial consists of the following:

1. An explanation of three basic rules: multiples of the square, the golden section, and the square root proportions.

2. Identification of each rule in the context of historical examples. The proportional relationships in these examples are identified with overlays by the computer. A bibliography will be included to encourage the use of other information sources.

3. Exercises which require the student to identify the relationships in context. The student's analysis is monitored and recorded by the computer. Hints and corrective feedback are immediately available. Other exercises include matching and sorting shapes of the various proportions by eye. Again, the student's progress is directed, monitored and recorded.

4. When a sufficient rote understanding of the rule is demonstrated, the student is challenged to play with the rules of proportion. The computer monitors each individual's definition and manipulation of proportional relationships in the context of a simple open-ended design problem. With a "mixed initiative dialogue," the computer engages the student in a conversation about her/his work which attempts to uncover, via the Socratic method, the student's own perception of both the form and the process of forming as it unfolds. For the student with no clear purpose, the dialogue acts as coach or tutor to help him/her discover one. A simple "cognitive audit trail" is constructed and can be reviewed by the student and the instructor.
One aspect of software development I find especially challenging is the design of user interfaces:

Screen design, pointing and choosing actions, dramatic flow, system action emphasize the tutoring nature of the exchange...[They should be incorporated] as intrinsic parts of the pedagogical design. The interchanges can be looked at as interactive media events that electronically symbolize and reinforce the essence of human/human tutoring encounters.17

New studies of user interfaces for CAL are questioning some of the standard practices of the past.18 One wise researcher has studied computer games to find out why they are so captivating.19 I expect to learn a lot from the students when we pilot the first tutorials next fall.

FUTURE GOALS

My eight year old son has an Apple IIc. We recently bought him a piece of educational software called Where in the World is Carmen Sandiego? It is a game of espionage: your job as the newest employee of the Acme Detective Agency, is to track down the international criminal, Carmen Sandiego, and her gang, the Villains' International League of Evil (V.I.L.E.) The felons are hiding out in one of 30 cities around the world. You unearth clues along the way which identify the cities or the countries they are in. A map of the world and the The World Almanac Book of Facts are included with the software. In addition to discovering Carmen and her gang, you also discover significant facts about various places in the world. "The thief was last seen leaving the currency exchange with a briefcase full of kroners." After a couple months of hard detective work, my son has learned a lot of information about the major cities and countries of world and constructed a fairly decent mental image of the world's geography.

My goal for the basic design courseware is that each of the individual pieces of the electronic textbook be associated, like our knowledge of the world's cultural geography, in a network format. In computer jargon this structure is called "hypermedia." "Hypermedia is a framework for non-linear representation of symbols (text, graphics, images, software code) in the computer."20 It is possible to create such a framework using object-based programming languages like Hypercard. Another similar language is being developed by an ISU computer science faculty member, Pete Boysen. His language will make it possible for me to exploit the university's most powerful computer resources.
Of hypermedia futurist Christopher Dede writes:

Hypermedia as a knowledge representation format empowers instructional design based on cognitive principles of learning such as active structural networks, schema theory, web teaching, and generative learning. 21

An intelligent tutoring system will use a mixed initiative dialogue to coach individual students to discover, on a "need-to-know basis," the principles and procedural models available in the electronic textbook. The CAL system will be used to support a traditional task-oriented studio experience. The student may choose to represent and manipulate his/her design problem with the computer graphics editor and engage the tutor in a Socratic dialogue about that particular assignment, accessing any relevant tutorials. The student may also choose to represent and manipulate the problem with some other medium and search for relevant information on the computer. The system may also be used in a more structured way if the studio teacher chooses to make an assignment of a specific textbook entry.

To summarize, the ideal computer-assisted learning environment for the beginning studio includes:

1. A text and graphics editor with embedded training in generic computer skills.

2. An network of tutorials for fundamental descriptive and procedural knowledge, the electronic textbook. Normative information from all areas of the curriculum should be available. Expert models of problem solving strategies and heuristics for concept formation should be included.

3. An intelligent tutoring system which uses a Socratic dialogue to determine misconceptions and guide information searches.

My intention is to provide a computer-assisted learning environment which encourages what Schon calls "reflection-in-action." 22 The courseware development will obviously require continued research in CAL, design pedagogy, and CAD. The CAL system I have outlined here will support the studio objective by allowing for individualized discovery learning without sacrificing rigorous instruction of fundamental knowledge. This "cognitive partnership" 23 approach is a more appropriate role for computer technology in the beginning studio and will foster a more creative use of computers by future designers.
REFERENCES


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University of New Mexico/School of Architecture and Planning 2414 Central Avenue S.E., Albuquerque, New Mexico 87106 505/277-2903

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AUGUST 8 & 9, 1988
INTRODUCTION

Architecture and design education has always been concerned with graphic communication and the design process. This type of visual communication, particularly drawing skills, represents perceptual acuity as well as visual expression. It is presumed that there is a connection between the perception of an idea and the manner in which that idea is graphically represented. In architecture and design, drawing is the medium which not only conveys concepts and processes but also reflects shape, form, or style. Spatial drawing principles are crucial tools for the designer in understanding the development and formulation of design solutions.

Until recently, little attention has been given to the role of computer technology as an instructional aid in the introduction of spatial drawing concepts. This paper addresses the role of CAD programs as a teaching aid in illustrating the generative processes of projection drawing theory and the construction principles that traditionally have been presented by static-graphic means to beginning design students. The focus is to demonstrate how interactive computer 3-D modeling programs can help explain orthographic, axonometric, oblique, and perspective drawing processes as design tools in the preception and shaping of visual solutions.

THE CONCEPT

The concepts of spatial drawing theory and the relationship of object and space in the drawn image are often difficult for the beginning student to understand when they are presented in the static formats of traditional graphic instruction. This discussion intends to address the issues of the drawing types and projection theories that determine spatial development and influence the design process. The thesis of this paper is that the use of computer modeling can structure the developmental process and spatial understanding in an interactive way and, thereby, aid students in their own instructional activities.

Computer instruction can illustrate the spatial concepts and construction methods of different design drawing types. By using simulated computer models of an object or building, animated and sequenced images can help to explain the concepts of drawing projection systems and view orientation. Programmed images and construction sequences offer an interactive explanation of the principles that distinguish the different types of drawing "families," understood as orthographic, oblique, and perspective, and demonstrate the spatial concepts that organize orthographic, axonometric, oblique, and perspective image generation. This provides the student with an opportunity to witness and explore the different drawing types and the formulation processes necessary in the communication of a particular spatial condition or object.
METHODOLOGY OF THE PROJECT

In developing models to illustrate drawing concepts and procedures, we have accepted traditional terminology and the established methods of construction. From the fifteenth-century Italian Renaissance of Brunelleschi, Alberti, and Piero onward, many treatises on the subjects of perspective and technical drawing have been developed [1]. This history has occupied "the subject of consciousness" which relates to the perspective spatial illusions founded in art history [2]. The modern movement popularized axonometric projection to reflect the modernist liberation—in this case, it was a liberation of a fixed view [3]. The centuries of development have witnessed, for the most part, refinements of technique as the concepts of Euclidean geometry struggled for an expression of infinite three dimensional space.

Of the many manuals available on drawing and procedures of "how" to draw, most provide step-by-step procedures to generate views. These illustrated outlines are generally meant to supplement blackboard demonstrations and to reference construction methods. Using this as a point of departure, we have patterned our approach from two primary sources: C. Leslie Martin's dated Design Graphics, first published in 1952, and Kevin Forseth's clearly delineated Graphics for Architecture. These texts and a few others provide an outline of terminology and procedures. It must be noted that Forseth's effort is a greatly improved version of Martin's Graphics for Architecture and clearly organizes what Design Graphics defines.

Our method of demonstrating drawing projection systems and view orientation using computer models begins with a completely drawn example (model) and then dismantles the object with various drawing types and drawing manipulations. This "reduction" of a model brings about a clearer view of the specific information of each drawing type and construction technique. This "detaching" of information from the "whole condition" reflects the real function of drawing—the illusionary qualities of a proposed condition [4]. It is a working in reverse from the usual "building-up" procedure which uses the simple geometric objects and shapes commonly illustrated in most drawing texts.

The dismantling model imparts other important lessons to the beginning student beyond isolating drawing conventions and concepts. The use of drawings as analytical tools in understanding the complexities of buildings and objects is shown by the editing of the many different singular aspects that make up a building whole. Spatial organizations, proportional conditions, details, structural systems and other systems of ordering are revealed when a composition is broken down into smaller parts. For the student, each drawing type isolates and provides specific information inherent in a whole composition. Detaching information also demonstrates the ability of drawing as a means of constructing a composition—that a completed building or object may be conceived and developed by drawings, and drawings of several types. For the beginning student, these lessons of what drawings do are as important as learning the skills and techniques of drawing communication [5].
SELECTION OF DESIGN OBJECTS

The building or designed object to be programmed as a decomposition example can come from many sources. An important consideration is the availability of material. Published drawings of plan, section, elevation, and image provide the technical information necessary to transfer to software and allow the development of a series of images. Our choice has been Wright's FALLINGWATER, but almost any important, well-documented building could be used. FALLINGWATER provides a convenient model because the computer images can be generated in a fairly direct manner; and, also, much material has already been developed on the subject. Also we felt that the planar quality of the wall poché added to the example's clarity. Plan, section, and spatial order systems and details serve to evoke a systematic graphic dissection. This, then, serves as our model.

IMPLEMENTATION

Our procedure in demonstrating drawing concepts follows the Martin and Forseth format: define the different types or "families" of drawings; explain the generative processes; and, then, illustrate each issue individually. Graphics for Architecture, at the onset, outlines a very clear explanation of terminology and illustrates the important differences between structural and pictorial (design) drawing types—a distinction rarely made or understood in other manual instruction texts [6]. The significance of classifying drawings is that one can then understand how an image is generated (conceptual bases) and what kind of image or view results.

Using computer models, the examination of these issues occurs on a comparative basis. Split-screen display and explanatory text provide images which can be generated from programmed software libraries to illustrate differences. As in Forseth's "pictorial effect" groupings—multi-view and single-view, plan/elevation ("multi-view")—are placed next to an oblique, perspective, or isometric (single-view) example. However, in the illustration and explanation of the different "projection systems" the comparison is more complicated, requiring several images which must display projector rays and introduce the concepts of picture plane. Here several animated images are necessary, composed on a quartered-screen display and sequenced.

DEMONSTRATION PROCEDURE WITH 3-D MODEL

In our example of FALLINGWATER, an axonometric view is first introduced. From this the specific issues are illustrated. The 3-D view is unfolded to show top, bottom, and side views and then cut to illustrate the concepts of plan and section. Here the notions of multi-view and single-view can be compared. The topic of picture plane is introduced by positioning the model with the picture plane to demonstrate projector relationships. Surface and line-wire techniques illustrate the relationships and variables of the model as well as the conceptual components (picture plane, projector rays, and position of viewer).
The establishment of a vocabulary and an understanding of the structural differences of various drawing types allows the model to demonstrate the construction procedures particular to each drawing type. With FALLINGWATER for example, one-and two-point perspective view generation uses the planar qualities of Wright's house to show the construction procedures and their relationship to plan/elevation. Again, surface and line-wire as well as color coding delineate sequential events of view generation and differences.

A storyboard outline of the model directive is as follows:

ISSUE 1: Drawing classifications.
List of drawing types according to visual effect and developmental processes related to picture plane orientation.
SCREEN IMAGE: Split screen:
  One- list of drawing types and sub-types; cursor identifies image to be displayed on screen two
  Two- drawing type identified by cursor on screen one, i.e., orthographic elevation drawing type, elevation image of example (model used).

SCREEN IMAGE: Split screen:
  One- multi-view; plan/elevation.
  Two- single-view; paraline, isometric and oblique, and perspective, one-and two-point. Animate images with explanatory text.

ISSUE 3: Projection drawing concepts of picture plane and projector rays.
Define drawing types (orthographic, oblique, and perspective) through: object positioned to picture plane, projectors from object to picture plane, and position of observer and projectors to each other.
SCREEN IMAGE: Quartered screen:
  One- object (building in 3-D view),
  Two- projectors perpendicular to picture plane, (orthographic),
  Three- projectors oblique to picture plane (oblique),
  Four- projectors converge to a common point (perspective).

ISSUE 4: Multi-view/orthographic drawings demonstrated:
Unfold elevation views, cut plan and section views.
SCREEN IMAGE: Single screen with animated view generation of 3-D model unfolding or projection of elevation view, 3-D model "cut" to expose plan layout, 3-D model "cut" to expose sectional view.

ISSUE 5: Single-view/orthographic axonometric drawings:
isometric and dimetric development and picture plane relationship.
SCREEN IMAGE: Single screen with animated view generation of 3-D model
(1) model, projectors, and picture plane construction,
(2) model decomposed to axial (isometric, dimetric, etc.) lines,
(3) rotation of model to demonstrate construction of axis principles.
ISSUE 6: Single-view/oblique drawings:
plan and elevation oblique development and picture plane relationship.
SCREEN IMAGE: Single screen with animated view generation of 3-D model
(1) model, projectors, and picture plane construction,
(2) model decomposed to plan oblique axial lines,
(3) oblique model animated with rotated plan,
(4) model decomposed to elevation oblique axial lines.
(5) oblique model animated with angle of axis and scale variable.
Split screen with animated view generation of 3-D model
One - plan oblique
Two - elevation oblique; variables of line direction and scale compared

ISSUE 6: Single-view/perspective drawings:
one-and two-point perspective projectors relationship to picture plane.
SCREEN IMAGE: Single screen with animated view generation of 3-D model
(1) model, projectors, and picture plane construction,
(2) model, projectors, and picture plane in relationship to:
   (a) field of vision
   (b) station point,
   (c) horizon line and vanishing points.
(3) model and picture plane in construction sequence with plan and elevation (linear two-point method).

SUMMARY

In this paper, the idea of using computers in the instructional system of spatial Drawing Theory and Foundation Design construction is presented. The paper also gives the possible ways to implement this idea. In creating such an instructional system, the generation of a large number of computer images constitutes a major time commitment. The use of the Martin/Forseth outline represents a point of departure which may, because of the computer's animation qualities, require an alteration in structuring the sequences and presentation of models. Much more experimentation is needed to manipulate images and models with the issues. This must be viewed as a working paper.
REFERENCES:


[5] For examples of how drawings are used to analyze buildings, see Geoffrey Baker, Le Corbusier: An Analysis of Form, and Roger Clark and Michael Pause, Precedents in Architecture.

This group of papers addresses the creative and spiritual aspect of the design process. The studios tend to be less structured by specific methodologies, but rather are governed by an attitude about the students' potential and personalities. These processes tend to be more open-ended, and right-brain oriented.

Akkurt discusses the fragile period when ideas are incubating, and the need to give students time and confidence to generate ideas within a disciplined application. Culver Hill uses meditation to open the mind to what Postell calls "abductive" thinking, imagery and visualization. He develops an attentive internal environment for problem-solving. Hartnett's concern is to eliminate fear and to teach students to find and rearrange from the context around them. Reno and Kaplan use a project to design a community called Otherside, a counterpoint to the well-known development at Seaside. The new town is based on a reevaluation of the essential elements of an American community. Chaffers and his students define a glossary of architectural concepts and ethics. He has students record their visual images at the moment of problem assignment to encourage them to trust their preconceptions.
5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT
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APRIL 8 & 9, 1988
CREATIVITY AND THE BEGINNING DESIGN STUDENT

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The method of artistic creation and the proofs of scientific theories share aesthetic quality as a common ingredient between them. However, the beginnings of these processes differ though. In the case of artistic creation, the creativity is tapped from emotional clues that happen inside and thus art is born out of artist's need to communicate such inner emotional disturbances to others while in the case of proofs of scientific theories the scientist's creativity is inspired by the hints from outside that disturb the scientist's sense of logical harmony. To complete the process, the scientist validates the results by scientific observations while the artist uses non-scientific means such as scale, proportion, form, dimension, balance, etc. in realizing the work. Both processes require a sharp critical eye in shaping the growth, maturation and completion of scientific and artistic results. As opposed to scientist's rational measures to attain results and the artist's ability to order and tame the creative flow of emotional responses, the architect's measure to his work largely rests on the degree of competence to fuse the technological availabilities together with the artistic imagination. The architect sensitizes the experience of environment through meaningful relationships of spaces responsive to our senses while gratifying desires and not only meeting the needs. To realize it, the architect resorts to creative process with the aid of technological possibilities at his service. Ludwig Mies van der Rohe said:

It (architecture) is the crystallization of its inner structure, the slow unfolding of its form. That is the reason why technology and architecture are so closely related. 

Creativity thrives on the desire to discover and on the desire to express, both of which happen to be the pinnacle of our humanness. Creativity is initiated by a stimulus. Discipline is needed throughout the creative process and, especially, during the initial stage which is made up of groping and searching phase. This phase is scattered with hesitations, doubts and uncertainties. At this point, the creative person (in this case the design student) should be disciplined to be absorbed in the work to prevent self-serving excuses or needlessly prolonged distractions. The delicacy of this phase in the process of creativity should be handled with utmost sensitivity by the studio instructor. Because of the very personal and the very private nature of it at this early stage, the design student should not be interfered in substance other than just only to be disciplined. This phase happens to be the most passive stage between the design instructor and the design student. For the student, the most important task is to analyze and to comprehend the design program thoroughly by feeling and understanding the very nature of the particular institution the student is going to design. Louis Kahn said: “All that we desire to create has its beginning in feeling along. This is true for the scientist. It is true for the artist...” Once the nature of its existence is realized or felt then the desire will be pregnant to architectural availabilities, such as: space, structure and materials.

Internalizing the project may even go without the pencil touching the paper though each person has a unique approach to this phase. This phase happens to be the most personal aspect of creative process. In Le Corbusier's case, he said:

When given an assignment, I have a habit of committing it to memory
by not allowing myself to make any sketches for several months. The
human mind is, by nature, fairly autonomous. It is a container into
which we can pour the elements of a problem helter-skelter and let
them float, simmer, and ferment for a while. Then, one day, a
spontaneous inner impulse triggers a reaction. We pick up a pencil,
a piece of charcoal, or a colored pencil (color is the key to this
process) and put it down on paper. The idea, or child, emerges. It
has come into the world: it has been born. 

Alvar Aalto sums up his own decision--making process such as:

When I personally have to solve some architectural problem, I am
constantly--almost without exception, indeed--faced with an obstacle
difficult to surmount, a kind of "three in the morning feeling."
The reason seems to be the complicated, heavy burden represented by
the fact that architectural planning operates with innumerable
elements which often conflict, social, human, economic and technical
demands combined with psychological questions affecting both the
individual and the group, together with the movements of human
masses and individuals, and internal frictions--all these form a
complex tangle which cannot be unraveled in a rational or mechanical
way... I then move on to a method of working which is very much like
abstract art. I just draw by instinct, not architectural synthesis,
but what are sometimes childlike compositions, and in this way, on
this abstract basis, the main idea gradually takes shape, a kind of
universal substance which helps me bring the innumerable
contradictory component problems into harmony.3

After the passive phase, the solution to the problem may start surfacing into
consciousness. This is called "insight" by the Gestalt Psychologists.4 The
sudden appearance of the insight is explained by two hypotheses. One
hypothesis assumes that the brain after a rest pulls together enough energy to
deliver the solution suddenly.5 The other one explains it such as that the
rest enables the person to get rid of the old mental traps while mobilizing
the mind with a fresh attempt to look at the problem from another angle.
Freud explained that consciousness was an organ of perception. A person is
aware of the mental percepts that he has at a certain time. However, he can
not know the unconscious unless by hypnosis or free association under the
direction of a psychoanalyst. Foreconscious happens to be the area, between
conscious and unconscious, where perceptions and memories are channeled to be
recalled at the person's will.

The idea before surfacing to the consciousness as an insight could have been
observed during the period of incubation. Incubation, according to Graham
Wallace, in his book "The Art of Thought", is the phase to put the work aside
after an initial work on it. Accordingly, if one tries to examine one's
foreconsciousness during the incubation, one would find out ideas undergoing
tests while the foreconscious laboring on the creative project. Thus,
foreconscious is a passageway to reach out to the depths of emotional
intensity.

The foreconscious is the avenue for reaching the unconscious with
its depths of emotional intensity. If the foreconscious works as a
meeting ground for the form and order of consciousness on the one
hand and the chaotic energy of the unconscious, on the other, the surging of an artistic form in consciousness might well carry with it an emotional charge from the unconscious. According to Freud, sometimes the foreconscious thought is pulled down into the unconscious so that it might be remodeled there.8

In the case of arts, this delicate sieve allows only aesthetically pleasing forms to appear in the conscious. The sieve is cultivated by refining the craft. Good craftsmanship also go hand in hand with the coalescence of the conscious with the unconscious. Perfecting the craft diligently will certainly help to articulate ideas better regardless of their complexity.9

Therefore, not to hinder the ability to express oneself creatively, the craft of the discipline should be mastered. This will help the design student not only to know how it should be done but, also, make the student feel how it should be done. Lack of adequate competence in one's craft will hinder better ideas filtered through the sieve to appear in the conscious because sieve is part of the craftsmanship of any art. The results of creative effort are chaotic without the aid from the conscious as the conscious provides order while without the help from the foreconscious with its frequent charges into the unconscious creative work lacks vitality.

The craft can be learned under guidance; thus this part of creativity is the most teachable. The final phase consists of the most conscious side of the creative process. In this phase, the work is revised, evaluated and channeled toward the best possible solution by frequent crits. This is achieved through the design studio set-up where helpful crits are given on the project. The sensitivity, creativity, expertise, guidance, communication demands and discipline of the instructor count enormously on the successful completion of the creative process. Likewise, the instructor shall take into consideration an utmost discretion in his or her relationship with the student in directing the student and, therefore, the work by enriching the student's design abilities without dominating the course of the creative process. A successful instructor brings the creativity out of the student and makes the student aware of that while being a catalyst between the student and the architecture to inspire him to design "a work of architecture" in Louis Kahn's words "...to be presented as an offering to architecture."

According to Stephen King and Kent Spreckelmeyer:

First, a design problem is composed of many--as well as conflicting--points of view, objectives, functional requirements, and individuals. Second, a period of absorbing this diffuse and immense amount of data takes place and the designer must reach a point of appreciation--not necessarily understanding--of the entire problem. Next, the designer reaches deep within a creative reservoir (this I will call subconscious--my words) to generate a large number of ideas and potential solutions. Finally, some form of synthesis or process or discrimination occurs that allows these ideas to be brought into balance (conscious takes part in this to order the creative energy--my words) to address the original problem statement.10
The instructor shall emphasize and demand fluency, flexibility and originality which are the tools of creativity. In a design studio, fluency is the ability to express one's ideas verbally and graphically in the best possible way. Flexibility is the skill, almost a talent in some cases, to choose a different view and direction to approach a particular situation or a problem. It takes to look at a problem from different perspectives than the previous ones that, already, have been utilized. Originality is a redefinition of ideas in new ways. To a larger extent, these features of the creative process can successfully be taught under normal design studio teaching process.

The intent of architectural design studio is to expose the student to the inherent nature of architecture by using projects as vehicles to cultivate communication between students and the instructor. Only under the most conducive studio setting the unbounded creative energy could be harnessed and directed into understanding the nature of architecture through the discovery of discreet solutions to each project. It is none other than this discovery that will bring the quality out: the quality imbued with psyche and feelings fused into each other at their best. Otherwise, it is not the intent, in the studio, to teach the student the method of architecture but the "spirit of method." Louise Kahn said: "The process of architecture is a bore. I know of nothing so insignificant in my mind as learning about method. Method is not important. But the spirit of method is tremendously important. It is the true measure of architecture." The design studio becomes contributive only if it can create a conducive atmosphere that will stimulate each individual to offer ideas to be experimented and examined while inviting participation in discussions for all to share and benefit from. In a design studio, the inspiration of creativity must prevail over any possible hindrances. It is the responsibility of each participant, the student and the instructor alike, to contribute to its realization and its sustenance. The overriding theme in the guidance of a design studio is the exploration of the nature of architecture by means of the discovery of analytical solutions to studio design projects through meaningful organization of spatial relationships to fulfill a valid purpose as well as stimulating an insight into the nature of materials and methods of architectural construction together with the related engineering systems. In general, the discovered analytical solutions to studio design projects are the outcome of analyses of site, climate, materials, construction, structure, light, HVAC systems with programmatic internal and external hierarchical demands as always encountered in the realization of a particular built environment without disregard to emphasis on historical continuity as well as appropriate required changes in accordance with times. All the above are thoroughly examined for the sole reason to achieve a contributory response to uplift the physical and emotional well-being of man through architecture. It is the intent of the design studio not only to explore how to meet human needs, desires and aspirations in relation with the environment but most definitely to contribute to their enhancement. The excursion into the realm of architecture engages senses, feelings, emotions, intuition and psyche with a catalyst none other than inspiration.

It is the primary role of the instructor to cultivate the creative imagination by exposing the design student to the notion of architecture with all its tangible and intangible aspects through which to accomplish the student's level of conception to advance to the level of realization on a particular design project. Here, the instructor becomes a motivator as well as a catalyst between the student and architecture. Also, the instructor can be an
initiator of inspiration while inspiration being, according to Igor Stravinsky, a discovery that gives rise to more emotions and they in return generate more discoveries while such stirred emotions are none other than inspiration itself. To Igor Stravinsky:

All creation presupposes at its origin a sort of appetite that is brought on by the foretaste of discovery. This foretaste of the creative act accompanies the intuitive grasp of an unknown entity already possessed but not yet intelligible, an entity that will not take definite shape except by the action of a constantly vigilant technique. This appetite that is aroused in me at the mere thought of putting in order musical elements that have attracted my attention is not at all a fortuitous thing like inspiration, but as habitual and periodic, if not as constant, as a natural need. This premonition of an obligation, this foretaste of a pleasure, this conditioned reflex, as a modern physiologist would say, shows clearly that it is the idea of discovery and hard work that attracts me. The very act of putting my work on paper, of, as we say, kneading the dough, is for me inseparable from the pleasure of creation.11

Footnotes

6 L. F. Shaffer, B. van H. Gilmer and M. Schoen, Psychology (New York, 1940).
8 Bormann, p. 133.
9 Bormann, p. 134.
10 Kirk and Spreckelmeyer, p. 9.
National Conference on the Beginning Design Student (5th: 1985, Albuquerque)

Offered through the Research Office for Novice Design Education, LSU, College of Art and Design, School of Architecture.

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DEVELOPING THE INTERNAL ENVIRONMENT FOR PROBLEM-SOLVING AND CREATIVITY - A PRECURSOR TO EDUCATION AND THE FUTURE

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DEVELOPING THE INTERNAL ENVIRONMENT FOR PROBLEM-SOLVING AND CREATIVITY - A PRECURSOR TO EDUCATION AND THE FUTURE

To ride the crest of the Information Age into the 21st Century, educators will have to reverse the existing academic paradigm. Rote learning packages of "correct" information must be replaced by an emphasis on problem-solving, application of principles and concepts, analytical skills and creativity. We, as educators, must create a framework within which students will develop skills for a lifetime of continuous learning and enthusiasm for generating ideas. We must value and nurture the student's internal environment for incubation and illumination just as we have developed the external environment for preparation and verification. By encouraging development of the inner personal environments of the students as well as between the student and his/her external environment, we can begin to achieve a holistic approach in the total development of the student. This is the precursor to education and the future. Through a series of progressive relaxation exercises, the student can learn to control stress which is a major block to the creative mode. Through controlled guided imagery or centering sessions, the student can lubricate the holistic mind. By opening the mental doors that have been closed by traditional rote learning, the students can once again flow into a creative mode, a holistic mode, as naturally as when they were four or five years old.
Sir Stafford Beer and other "scholars of change" have observed that we are in the midst of a fundamental revolution in a Machine Age, shifting from the Machine and Industrial Ages to a Post Industrial and Information Age. In the Industrial Age past, skills were required to manipulate materials. In the Information Age, skills are required to handle complexity and change. This latter shift requires an emphasis on creativity, problem-solving, and problem definition.

While the educational systems of most countries in the world rely on rote learning, there are some curriculum centers where great emphasis is placed on problem-solving, application of principles, analytical skills, and creativity. Such higher mental processes are emphasized at these centers because the educators believe that this type of thinking enables the individual to resolve more readily the many problems he or she encounters in day-to-day living. These abilities are stressed because they are retained and utilized long after the individual has forgotten the detailed specifics of the subject matter taught in regular schools. These abilities are regarded as one set of essential characteristics needed to continue learning and to cope with a rapidly changing world. The centers believe that these higher mental processes are the important ingredients which make learning exciting and constantly new and playful.

The need for curricula relating to problem-solving and creative thinking is critical; our nation dropped from its world position of first place in patented inventions to third place. Our productivity is being challenged and surpassed by smaller nations. The National Science Foundation, the Academy of Science, and National Endowment for the Arts/Design America conducted seminars on the decline of the United States in world prominence in inventions and design and the answer always came back to education.

If, as architects, we are to share in shaping the future, or even to survive as a profession, then we must take an active role in creating a holistic approach to architectural education that (1) creates a framework for a lifetime of continuous learning and maintaining an enthusiasm for generating ideas, (2) creates an environment where acceptance of new and unusual ideas are valued, (3) creates a milieu of trust and acceptance where self-esteem is supported and self-exploration valued and actively facilitated. Beginning Design should (1) expand and clarify awareness of the physical, social and emotional environment, (2) clarify awareness of the needs and feelings of others by emphasizing respect for individuality, (3) expose students to new and challenging information about the environment, culture, and aesthetics, (4) build skills in problem-solving and productive thinking, to contribute to the solution of meaningful problems, (5) be open to individual students of varying abilities and talents who have unique ways of seeing and solving problems, (6) emphasize incubation and illumination as strongly as preparation and verification in the creative process, (7) encourage communication between the inner personal regions of the student as well as between the student and his/her environment in order to continue the creative process, (8) organize the class primarily on the teaching of concepts rather than of facts, (9) encourage fluency, flexibility and originality in every project to stimulate the creative process, (10) expand the students' world view and explore the future.
Many architecture curriculums would be just a step beyond technological trade schools if they were not diversified by being housed within the university setting. Several architecture schools (engineering and business schools, etc.) have fragmented their education into discrete, separate packages of information that tend to delimit the field. By accumulating enough of these rote learning packages, the architectural student will be trained to meet today's present needs and go into the job market.

Barron and Taylor in their book Scientific Creativity, state that it currently takes about five years for a student to recover from his/her University training before he/she is capable of innovative and creative research. Universities train their students to learn pre-existing solutions which are considered "correct" and to carry forth present standards that are acceptable to the past or present professions. Consequently new ideas are effectively blocked. Rarely are these students/graduates able to invent within their own field of study. This concept is substantiated by the fact that in the last hundred years, the majority of significant inventions were created by people educated outside the general field of their invention. Kodak, for example, was developed by three musicians.

The act of creation and design is a self-involvement and, by definition, a self-involvement is a private act. The importance of aloneness for creativity has been recognized by many Japanese companies. Minolta Cameras provides meditation rooms to which their employees may go to reduce stress and induce creative thinking. However, space is often at a premium and adding meditation rooms can be costly. It would be more cost effective to encourage the development of strong "internal" environments. If individuals were trained to develop strong "internal" environments they could experience the positive aspects of being alone which are important for creative design, without physically having to be alone. This includes the ability to relax and produce visual imagery; a precursor to creativity, as is often cited by geniuses.

Willis Harman states that "of the two aspects of awareness - awareness of the external environment and self-awareness - modern society has specialized in the former to the detriment of the latter."

From primary and secondary schools to the university, most educational systems have emphasized and reinforced blocks of knowledge that utilize the logical, rational and sequential problem-solving skills that can be easily evaluated and measured. Plato states that whatever is honored in a country is cultivated there. While the above left hemisphere skills are indeed necessary, the right hemisphere skills of imagery, invention, creativity, spatial visualization, and correlation of knowledge have a tendency to atrophy. Allan Watts states that there are Eastern meditative exercises designed to expand the mind. In the East, exercises of this sort are for the purpose of getting in tune with the unconscious.

When Western people train the mind, the focus is generally on the left hemisphere of the cortex, which is the portion of the brain that is concerned with words and numbers. This enhances the logical, bounded, linear functions of the mind. As educators we must balance these skills for each person to be able to reach his/her own potential.
Only a student who is in charge of his/her body and mind can look with enthusiasm to the future, meet problems with new solutions and be excited rather than threatened by possibilities of changes in world views. William Schutz comments that "Man's self-concept is enhanced when he takes responsibility for himself." Fortunately, by developing the proper supportive internal environment, the students coming out of our high schools are resilient enough to recover, in a short time frame, from a twelve year education moratorium on creativity and image-making. In my beginning architectural design class I give the students official sanction and permission to be creative, holistic, individuals. With that permission comes an attitude of support for self-esteem, open-ended problem-solving sessions and exercises that lubricate the right hemisphere.

At critical points in history, those rare, dedicated few who discovered, remembered, or were taught the way to open the channel to their deep unconscious (to their idea processor) seem to have been intuitively led to spread their knowledge where it might do the most good.

At the first class session, I explain what physiological and psychological feelings the students might experience during the semester as a result of the new mental exercises which develop their "internal" environments and why it is important to replace their current academic paradigm for one that opens possibilities for now and the future. During the second class period, I start the first of six sessions which teach the students how to physically relax. The exercises I use are the Jacobson progressive relaxation exercises. Each session, given at the beginning of class, takes approximately twenty-five minutes out of a three hour design lab. During the seventh and eighth class periods, I introduce self-hypnosis concepts with a lecture and question period by a psychologist from the Educational Psychology Department. For the rest of the semester, each class has a ten minute guided imagery or centering session that is preceded by a progressive relaxation exercise. These guided imagery sessions may be either verbal centering or musical centering exercises.

All of the sessions are conducted with the students lying on their desks in a dimly lit room. Some of the centering exercises are project specific to generate new imagery while others deal with guided imagery to music. The music sessions are non-specific and stimulate free imaging. Changing the type of music will set up different sets of images and emotions. The kind of music used is important. It must be music without words. The brain thinks in images, not words. Each word, even in music, has one or more trigger images. Thus, subconsciously, the student could be fighting the preconceived images from words of the song which interfere with the creation of fresh, new images. Examples of music that are beneficial for centering and/or designing are electronic music (Eno, Jarre, Kitaro, etc.), instrumental (guitar, classical, eastern, etc.) and environmental (ocean, rain, storms, etc.).
In the biographies of Einstein, Mozart, Kilby and all great creators, one will find descriptions of centering and total absorption not unlike the following statement by E.T. Hall about primitive man.

The awareness and attention of primitive man operate in perfect harmony during the hunt and there is no sense of a passage of time, for the hunter lives in an eternal now. Something similar happens when a person listens very intently to a piece of music or engages in creative work. There seems to be no "self" present, for the awareness and attention of the whole mind and body are fully absorbed so that when the music, or the task, ends there may be a sudden shock of falling back into the "real world" and discovering that a considerable amount of time has passed.5

The progressive relaxation exercises and centering sessions lubricate and develop the fertile environment for the incubation and illumination areas of the four steps, (preparation, incubation, illumination and revision or verification), in the creative process. Stress and tension block creative imagery. We've all had the experience of lying in bed, finally relaxing after a busy day, and have a barrage of images and ideas flow across our consciousness. The tension keeps one locked into left hemisphere thinking (rational, logical, sequential) and blocks out new ideas and creative imagery trying to surface in the right hemisphere. As you relaxed in bed, your suppressed right hemisphere saw the chance to flood your consciousness with ideas, solutions and dreams.

Usually before the end of the semester, my students can begin to switch, through their own volition, into the creative mode. At the beginning of the semester, the students look for the one right answer. By the end of the semester, the students are trying to decide which one of their self-generated right answers to use. No longer do the students have to wait for the hand to descend from the cloud and turn on the light. They have the feeling that they have developed some control in holistic thinking. Mumford remarks,

For who can set bounds to man's emergence or to his power of surpassing his provisional achievements? So far we have found no limits to the imagination, nor yet to the sources on which it may draw. Every goal man reaches provides a new starting point, and the sum of all man's days is just a beginning.13

I refer to the right hemisphere as the creative and imagery hemisphere even though it is very dangerous to do so in a crowd of architects when 30% or more of them could be left-handers and opposite eye dominants with mixed brain functions. The right hemisphere also correlates information from both the hemispheres and enables one to think in a holistic sense. Tension and stress block out right hemisphere correlation and creativity. Think back on the time when you had stayed up late studying hard for a major exam. As you walked into the examination room, you began to get nervous and tense and your recall of the studied information began to slip. Your mind went blank. Tension and stress block access to the whole brain and its functions. My students now use some of the short tension-relaxation exercises before and during their university exams to retain access to their whole mental facilities.
Actors and athletes have for years used some form of guided imagery to improve performance. The better acting schools use relaxation exercises and guided imagery as the core for developing an actor's concentration and ability to stay in a role unbroken by fragmentation. Several professional and college athletic teams are using guided imagery before games and even to substitute for practices. Edward Hall says:

Coaches in all sorts of fields have begun to ask the members of their teams to time themselves with stopwatches while imagining a run over a particular course on which they will later be competing. Contestants try to image every part of the course - each curve, each soft spot, all of the straightaways - running the course in their head in exactly the same way that they would when actually covering the course in competition. Drivers and athletes not only come within seconds and hundredths of seconds of their actual performances, but also have been able to get valid practice in this way. It is safer, saves wear and tear, saves course and pit stop fees as well as fuel costs. Both coaches and participants feel acrobats will recognize parallels with the kind of mental practice they are used to doing.

The United States Olympic Training Center in Colorado Springs, Colorado, is heavily involved in progressive relaxation exercises and guided imagery. The Olympic sports' psychologists have found, through the use of electric monitoring, that when the athletes are performing at an Olympic level, they are in their right hemisphere and centered. The whole body and mind are correlated and acting as a holistic entity. The sports' psychologists refer to the athlete's development as 90% mental and 10% physical. After an athlete arrives at a plateau of physical competence, (which gets them to the Olympic Training Center) their real education begins with trying to achieve peak correlation of body and mind. After some communication with the Olympic Training Center, I found out that we were using the same progressive relaxation exercises. The guided imagery exercises were, of course, different in that the Olympic Center's were sport specific. In both cases the goal was for the individual to have access to a mental potential that was no longer dominated by random accessibility. By opening the mental doors that have been closed by traditional rote learning, the students can once again flow into a creative mode, a holistic mode, as naturally as when they were four or five years old.

In this stillness, mind and body are no longer experienced as being divided and a great energy floods the whole system. A person may no longer feel bound and restricted by the time and is alert, almost vibrating with awareness. This stillness can then lead to more effective forms of action in which mind and body, attention and awareness, self and consciousness are no longer divided. It is the stillness not of sleep or boredom but of the tiger in the forest or a mind that is totally focused on a creative task. 

David Peat
REFERENCES


18. Progressive relaxation research was conducted at Harvard Medical School by a team led by Dr. Herbert Benson, a well-known cardiologist and Director of the Hypertension section of Beth Israel Hospital in Boston. Their studies demonstrated the existence of a response involving metabolic, respiratory, and glandular processes that seem not only to counteract the harmful effects of stress but to promote maximal states of health significantly beyond those human beings normally experience. This response is not only the physiological reverse of flight or fight.
But like the flight or fight response, the relaxation response produces a state of alertness to certain kinds of phenomena. It is a state of alertness to the inner world, to the symbols, signs and portents of the unconscious.

19. A guided imagery or centering session exercises the right hemisphere with verbal or auditory cues in all five senses.
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APRIL 8 & 9, 1988

National Conference on the Beginning Design Student (5th: 1985; Albuquerque)
Session I: 1:45 p.m. - 3:00 p.m., Friday, April 8th.
B - "Drawing and Modeling", Room 231A, New Mexico Union
Poster Session I, 5:00 p.m. - 6:00 p.m., Friday, April 8th.
Jeffrey S. Hartnett
Visiting Assistant Professor
University of Arkansas
Fayetteville, Arkansas

"Best Beginning Projects"
"Flat to Round and Back Again: Representations"
My visual presentation will show two projects; I hope you enjoy simply seeing them, but first I would like to make some introductory comments.

It is a very immediate concern for all of us: "what is the nature of a student's first immersion into this Brave New World of architecture?"

Unfortunately, unlike what our wise Mr. Huxley can do in performance with his hypothetical characters, we cannot begin now to genetically breed our future students to be naturally gifted in conceiving and in manipulating complex spatial creations, or in representing those future architectural realities.

Our public schools continue to train our children to, somewhat successfully, deal with the majority of concerns in our national culture; specifically, those scientific and quantitative concerns on which our national economy and power is based, and on those relevant portions of the humanities upon which we base our Western "morals", our national values. This is a world, as Betty Edwards would describe it, of "verbal, analytic, symbolic, abstract, temporal, rational, digital, logical, linear" thinking. Incidentally, our being educated in "modern" times has left us with the (blind) ability to criticize a student's project almost exclusively with this mind-set, in these terms. It's not "scientific", nor "professional", to be "intuitive" anymore. Public education puts stress (in both senses of the word; our brain halves become unbalanced; and harmony is balance) on our verbal halves, while spatial and formal creativity gets relegated often to "elective class" status. Especially important is the point raised with Edwards by Don Dame, an art professor, concerning the difference between art and simply seeing/drawing; it is the same distinction as between poetry and basic instruction in reading. It is very optimistic to think we can get, say, Nancy Reagan, as our spokesperson to increase the public's seeing/drawing ability, when we have so many problems with just educating the general public to be "literate" verbally. Art is made by a gifted specialist, and the legitimate vocational goal for some in our profession; but seeing is "orderly, constant, available, and dispassionate," and a necessary "skill" which all architects, no matter what their ultimate office responsibilities will be, should possess. Fear is displaced with Dame's observation that drawing is simply a natural process; it is "the time-bound activity of seeing."

My first contention: students largely fail in architecture school in the early years because of fear. We help instill that fear because of the egotistical wish on our parts to want to be the creators of artists, and quickly, instead of helping to train them in the early years to be gifted observers and representors of the real and imagined built environment.

Creativity, specifically design, is largely not in forming, but in finding: "creativity...consists largely in rearranging what we know in order to find out what we do not know, hence...we must be able to look afresh at what we normally take for granted." (George Kneller)

My second contention: our task is largely to bring architectural concerns "to light", and to encourage the integration of this (brave) new world into their real daily lives. While I was Professor Nan Blake's teaching assistant at the University of Texas at Austin, she expressed similar feelings with this lesson: "you know you're starting to think like an architect when you are con-
cerned about, when needing to mail a letter, the stamp, the envelope, and the stamp's relationship with the envelope." This "split", typical and natural (because of the mind-set ingrained from public education's methods and areas of concerns), especially of beginning students, and common even later, was apparent recently when, as an all-school four day charrette project students were asked to design a work-station for their desk "in the manner of". The level of quality had a direct relationship with whether it was seen as a school "project" or as a real world "task"; it was initially surprising that some students who could come up with elegant architectural solutions otherwise made crude objects; it was because their daily life concerns of utility and "real-ness" were still separate from their studio life. In my Introduction to Architecture lecture elective, to non-architecture majors offered to 300 university students at large, students are asked in their research project to bring all their collected plan, section and elevation drawings to the same scale, and by comparing ones they know (mostly local buildings, such as our Old Main) with ones only introduced in slide form in lecture and in textbook illustrations, they can hopefully come to bring into their real world at least one aspect of buildings "in history": their size. It is only somewhat successful, as to them drawings, of even local examples, are already too much of an abstraction to use as a personal reference.

In conclusion, a basic "building-up" of an understood architectural vocabulary and, following that, developing the skills and disciplines needed to work concretely and poetically can be brought to bear on a specific early project if and only if a student loses his or her fear of having to be "creative" (like an artist is creative), and if the real world creeps in and gradually integrates itself within the autonomy of their professional concerns. We must never lose contact with the world; we should be determined to really see it, and in minute, somewhat haphazard ways, transform the "senery" of our daily lives, and encourage students to draw and take responsibility for all of it. After several years of introductory architectural education, a student should be able to really enjoy the personal and professional adventure of an architectural design partly because he can draw and model ideas naturally well and without fear of inadequacy.

I would like to show you now, verbally and with slides, two projects which are illustrative means of how to lead beginning students into an increased ability "to represent some imagined constructed reality" (their design) through the architect's two typical methods of communication: drawings and models.

These projects were challenging to all students because they must be approached on three levels: (1.) Skills: graphic and formal representational ability (using the Ching Graphics book as a source), (2.) Craft: a more sophisticated plane of activity, involving issues of space, structure, type, order, and organization (using the Ching Form Space and Order book), and (3.) Poetry: material attempts to express culture and personality through architectural language. Simply by doing the arranged problem, students became immersed in some aspect of each level; each level must be discussed and criticized by his instructor, or students will not recognize each level's absolute importance. This helps to avoid the later year's split between students whose main concerns spans from the technological/professional perspective across to the poetic/conceptual position. All must be joined, this is not necessary to make "structures" or "art", but it is necessary to make architecture.
The first project was a "One-Candle Power Light Sentinel". The process is model to drawing.

The tall building, the tower, has been an architectural icon throughout history; the built vertical dimension acts as a spiritual pointer, as a landmark, as an image of corporate power, as the symbol, along with the rich farmland of Wright's midwest prairie, of American capitalist expansion and freedom of opportunity. Of course, it all started in Chicago, and the Chicago Tribune Competition, both the original one, and its recent repeat in 1980 here illustrated with Tschumi's and Jahn's drawings, served as inspiration for an introductory exercise.

The illusive quality of light, as the only means by which form can be seen, was discussed; quotes by Kahn and Barragan and the novelist Paul Horgan were read, and the rainbow of implications of this simple world "light" was pulled out of Roget's Thesaurus ("beam, blaze, brilliancy, effulgence, frame, flare, flash, flicker, glare, gleam, glimmer, glistening, glitter, glow, illumination, incandescence, luster, radiance, sheen, shimmer, shine, sparkle, splendor, twinkle"... I left some out), including, as Kahn would want it, "lights" antonyms ("blackness, dark, dimness, dusk, gloom, obscurity, shade, shadow"...). Using candles as a light source inspired a certain approach, fresh and subtle, and real, although it led to one casualty, a model going up in flames during the photographic session. (Her model wasn't structurally stable; another lesson to be learned.)

Incidently, an identical project was given concurrently with an introductory studio in Mexico, taught by a friend of mine, to see what regional differences would emerge, and few did, surprisingly.

Initially and quickly, a model, one in a "family of forms", was built. A manipulated 4"x4"x24" hollow tube of unknown "real" scale, lit from within by a single candle, was built. The sentinel's only purpose was to be "a source of beauty and wonder." Thereafter, two and three dimensional drawings are produced, reinforcing basic drawing conventions, and also trying to capture on paper those illusive qualities of light and dark. With this exercise, fear is reduced by replacing "symbolism and reference" with concerns with the elemental power of "light and shadow, color and emotion, silence and form." It was "real" to them, because the heat and shimmer of flame was real, the model's form symbolized nothing but its own form and hollowness, and they wanted to bring it home to show their mothers.

Afterwards, together, we built a city of towers, and looked at them from afar at night. They didn't believe they made a skyline so beautiful; "...while the sky is changing, those lights are the most beautiful thing in the United States! And you know? It's all an accident!" (Paul Horgan)

Finally, this is Chip Townsend's project, the most elegant solution. His conceptual text stated his goal as being to use "a number of planes placed 'randomly' to produce a beautiful pattern of shadow and light," but sensing a need for an organization, he uses a logarithmic spiral, the golden section. The following semester, his design for an Artist's House on a rural hillside shows confidence and craft.

The second project, entitled "Nine-Square/Cube", involved similar ideas. The process here is drawing to model.
Ching's first chapter on "point-line-plane-volume" was read and discussed. Le Corbusier's Domino house, using Villa Savoye as model, displayed how the rigor of the structural frame frees its modern painterly lyrical space. The implications of his Five Points were introduced. Peter Eisenman's exclusively formal and process-oriented work was analyzed, and its ability to create poetic space was discovered. George Kneller, again in The Art and Science of Creativity from 1965, said "it seems, then, to be one of the paradoxes of creativity that in order to think originally we must familiarize ourselves with the ideas [or, here, uses of architectural elements] of others." Finally, again as background, John Hejduk's now "traditional" exercises were read; he describes the exercise this way: "it is a teaching device to introduce new students to architecture... the student begins to discover and to understand the elements of architecture. Lattice, grid, pile, beam, flooring center, periphery, field, edge, line, plane, column, extension, compression, tension, translation, etc... the student learns to become aware of the meaning of plans, elevations, sections, etc. he learns to draw. He begins to assimilate the relationships between 2-dimensional drawings, axonometric drawings, and 3-dimensional shapes (models)...he begins to get an idea of how to build."

With our project, a long series of "built-upon" drawings (or "traces") are produced, beginning extremely simply with proportional ideas in plan, and "without any specific intention", i.e. without any specific goals, except simply to "discover the kinds of architectural spaces you can make by placing architectural elements in a restrictive yet thoughtful way." Fear is removed; they can't fail, they can only discover "less or more" about architecture's possibilities, in form and space (and in their own thinking). The problem statement says explicitly that "you are experimenting, not competing."

The first series of drawings ends in a delineated 3-dimensional drawing form of 12"x12"x4", which is then "turned on its side", literally, and the series continues to form a cube. As a way of helping to destroy preconceptions, a drawing of Rietveld's Schroder House of 1924, with its abstract formal quality, is shown "on its side" also, and the students see "it doesn't matter compositionally; the frame has also freed the facade". A cubic form of 12" sides, of no "scale" and/or "function", is finally produced and represented in many conventional drawing types, including perspectives (which starts to hint at a scale, and human occupation). Finally, a beautifully crafted model is produced.

At this point, the student really "discovers" the series of composed but herebefore "unseen" spaces which he has produced by manipulating a restrictive family of basic architectural elements forms, using his own personal strategy.

Finally, we see Archie Cox's project, again, the most elegant solution. Two semesters later, in his second semester of design studio, I believe his private Academy for the Arts shows lessons learned well.

Thank you for looking at the work with me; I hope at least your eye is pleased.
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Works of art are not mirrors, but they share with mirrors that elusive magic of transformation. The study of perception has documented not only our inability to copy nature but also our inability to see it, because our natural optics are filtered by prevailing styles or patternmaking. This is illustrated by the difference between a child's and an adult's perception of the object chair. Children, instructed to draw a correct perspective of a chair from memory, will depict the object in as varied forms as the number of participants. On the other hand, adults, in the Ames chair demonstration, will see three chairs, in the presence of one real chair and two distorted, skewed objects - so strong is their mental set to create uniformity.

The power of metamorphosis is dependent upon the reconstruction of the choice situation, with alternatives. The will to play, entertainment of the arbitrary, ascent beyond necessity, provides a position of freedom which allows the transforming powers of art to act upon our perception of use. Something is uncovered. Something is understood.

We have enlisted the house to study imaginative vision through play. Our vision of the American home in 1986 is The House of the Marked Cards.

In the tradition of pop-up children's books, the House is an attempt to construct a dimensional entity from a series of flat images.

The House resides between two dimensions and three dimensions: style and substance, image and space to live, conventions and chance.

The game involves the player's selection and ordering from programmed images: fantasies, status, values, and meaning.

The skill of the player, subject to a barrage of myth and publicity, is expressed by the illusion of stability of his Home and yet an independence from the object House.

**The Porch**
Images, portrayed as conventions, serve as myths to satisfy contradictions between people's beliefs and their everyday experiences.

**The Front Door**
Stories have been the traditional means of conveying myths, but in this century they have been supplemented by films, journalism, television, and advertising.

**The Bathroom**
The utilization of myths is necessary to commercial success.

**The Bedroom**
The images produced by consumerism are not based on what people need, but what serves immediate financial gain and are as disposable as a woman's wardrobe.

**The Closet**
Images mystify rather than clarify.
The movie "Brazil" casts art deco in the future, creating a disorientation in time.

The Kitchen
Architecture, as well as product design, has the capacity to cast myths into tangible form so that they seem to be reality.

The Den
Media buildings tailored to the profit motive, produce architecture of surface manipulation, two dimensional architecture.

The Sanctuary
Thin set designs, doll house Disney-like motifs are being perpetuated with content surplanted by poetic supplications of what the world used to be.

The Garage
It is a form that is readily adapted by commercial strip developer.

The Garden
Beauty, as an expression of individual values, is replaced by the consumer myth, that we are impotent and that to find what we need we must have the ability to buy it.

Seaside, Florida has been heralded at two national architectural conferences in the past year as perhaps the most important planned community in the world today. Its promotion brochure declares that the promise of Seaside is to continue traditions of your childhood, create traditions for your children and grandchildren. The homes at Seaside reflect the personalities of their owners and the neighborhoods. The new town. The old ways. Memories of Mediterranean Villages.

Design control has been defined within the sixteen-page Guide to Home Building, which specifies the six steps of review before the Certificate of Occupancy is granted. The simple language and graphic explanation disguise a relatively rigorous and unusual set of constraints ranging from mandated picket fences for deep front yards to a set percentage of front facade given over to porch. The building code, a rough specifications list, is the last agent of control. Provisions range from admissible roof pitch to required hidden hinges on all kitchen cabinetry.

The Seaside plan, a hybrid of European and American models, is motivated by two seemingly contradictory goals: overall consistency and cohesion balanced against what the architects call "authentic variety." The architecture of Seaside is an eclectic array of many styles, ranging from the Charleston sidebox house to the antebellum mansion, to the ubiquitous American bungalow. The dominant style is Victorian. This homogeneity is in part a copycat syndrome: prospective buyers who see a Rose Walk cottage want one just like it. Buyers are both ready and willing to pay up to $350,000 for such standards.

Public amenities are scattered throughout the town, providing focal points for the various neighborhoods and raising adjacent property values.

The home represents the last foothold of the expression of man's ability to create forms symbolizing himself within his world. Our intention, within a first year design studio, is to restore the students' confidence in their ability to invent
For our first-year, spring quarter design studio we elected to create a community hypothetically located adjacent to Seaside. It also occupies 80 acres and, with 500 dwelling units, is to be developed with the same density. The community that we were to develop, of our own invention, is intended to confront Seaside both physically and philosophically. It's major built elements include: CBD, commercial strip, boardwalk, and housing.

The Boardwalk is a half-mile long construction representing the transition from the private domain of the house to the public domain of the beach, a link between the lake and the sea, and serves as a bridge over the highway.

The housing is located on lots that follow the contour of a service/access road which periodically intersects the Boardwalk adjacent to lower/access nodes.

The design studio was organized to support the student's development of his/her personal language via three-dimensional manipulation of nonconventional elements. These elements were plastic scale model kits of autos, airplanes, boats, and rocketships. We were charged to address structure, space, and enclosure within these students' first architectural design studio. We defined structure initially in a general sense: the arrangement in a definite pattern of organization, which was to be manipulated by collage, linkage, and fusion.

Construction entails the obsession with separation and connection of pieces, with the connection of loose parts. The process of design involves the evolution of a series of images one after another over a period of time. Architecture can be observed both from a distance (from the outside) and internally (close up). As the observer approaches his design, the building becomes larger and an increasing amount of detail is revealed. Spatial imaging refers to the retina's capability of sustaining kaleidoscopic relationships. When one looks into the kaleidoscope, he sees an ordered system. The box is shaken and the elements move into a new order. In the mind's eye, the act of visualization involves the interplay between the imaginary and the real. Architecture, as art and construction, synthesizes thought that is unique to the individual with objects of conventional usage. The design process represents a transformation or evolution of spatial consciousness, one which records that interplay existing at the same time.

The following steps represent the ordering of an expression of self into house. (The images on the right screen represent one studio's work; those on the left are from the other's.)

1. A three-dimensional self-portrait, finding a unique order which describes oneself and illustrating this by the constructs: structure, space, enclosure.

2. Combine two plastic scale model kits and rearrange their elements to find a new composition or structure, denoting major and minor elements.

3. Enlarge a piece of the plastic model to planer and linear materials, continuing to explore the major and minor components.
4. Compose three perspective drawings of the previous model, three views rotating about the model.

5. Superimpose the three images into a single drawing.

6. Translate this drawing into a three-dimensional model of balsa wood.

7. Design a piece of the Boardwalk which facilitates communication between individuals of the community, addressing span and access.

8. Design a house which provides for eating, sleeping, living, working, and bathing. Its enclosure will provide natural light, ventilation and view to the Boardwalk, lake, and ocean. One third of the house is required to include a cabana or screened porch.

We contrast our community to Seaside in the following ways: Our community supports individual expression, in the spirit of do-it-yourself builders, by breaking codes and inventing a language. An emphasis on the detailing of the structure and enclosure rendered metaphorical evasion impossible. Most telling was the continuation of the initial self-portrait in the assignments dealing with programmatic necessity; the Boardwalk and the houses. The game we played with our students guided the organization of a piece, but not its outcome. Seaside, to assure beauty, has mandated taste by codes which create an illusion of borrowed memories. We contend that the two approaches demarcate the difference between what people need and what they are made to believe they need. Seaside's unity depends on facade and the picket fence. Our community sought substance, space to live, and chance: three-dimensional space. We called our community Otherside.

In a sense, all human thought is a form of play. Real games are like real life. Real-life situations do not have the precise solutions that chess or engineering calculations do. The mathematician John von Neumann's Theory of Games distinguishes between short-term tactics and grand, long-term strategies. Tactics can be calculated exactly, but strategies cannot. As in all realistic games which contain elements of chance and guesswork, there is no method which will ensure winning. What von Neumann's theory gives is the best strategy which provides the guide to success in the long run. As educators, our responsibility is to give our students the knowledge and the mental habits required for forming independent opinions. Students must realize their capacity to act on and direct their world, and this requires their participation through their imagination. The freemasons of Gothic cathedrals carried in their heads a stock not so much of patterns as of ideas. Civilization is not a collection of finished artifacts, it is the elaboration of processes.

John Hejduk has related the play hours of his childhood: 'I spent longs of hours and days with those British lead soldiers ... one constantly organized them in lines or marching soldiers, in all sorts of geometric battle patterns. Then there was war. Everything would disperse in chaos. A lot of them would drop dead. Then you would put them all back up, but maybe this time in a different pattern.'
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Basic Design: Seeing Through the Mind's Eye...
J. Chaffers
"The Challenge of Teaching Students to Tap their Intuitive, as well as their Intellectual Powers in Designing"

Abstract

The approach of designing with and through the "mind's eye" was developed in response to a recurring deficiency that I have noted among a great many graduate design students—an inability to conceptualize a comprehensive understanding of a given design task. Using fully rational and analytical approaches, many students never get beyond the "trees of the forest." Typically, they produce solutions that are mechanically-correct, but, otherwise, non-inspiring.

Having become reasonably proficient at addressing this shortcoming, "after the fact," I became intrigued with the thought of working in some direct way to prevent the deficiency from developing. Such thinking led me to seek the opportunity to test my ideas at the undergraduate level of design.

After securing this opportunity, twenty-one students were introduced to a set of ten basic design guides. These guides were introduced within the larger studio context of a 'whole sum' designing philosophy, a "form follows dialogue" approach to studio design which I have developed during twelve years, or so, of teaching.

The design students involved were in the second year of a four-year Professional Degree program and in the 3rd term of an 8-term design studio sequence. All students had completed two years of liberal arts studies and several held baccalaureates in other fields.

Studio presentations focused on three projects of two, three, and five weeks duration. Sited either on a volumetrically complex urban corner or a major pedestrian thoroughfare, all three efforts—an "Oasis for Bicyclists" (2 weeks), an "Urban Theatre" (3 weeks), a "Center for Peace Research" (5 weeks)—were conscious attempts to design with and through the mind’s eye.

In general, while programmatic and schematic guides were reasonably developed, conventional ‘bubble diagrams’ were never used. Instead, primary emphasis was placed on each student visualizing and capturing the (conceptual) 'whole' of his or her composition—even as its parts were being crystallized. This "honoring the flash of the whole" was achieved through extensive use of video-photography, 3-dimensional study sketches and 3-dimensional modeling.

Varying in scale from 1,200 to 12,000 square feet, the projects proved successful in helping students develop greater skill in organizing the seemingly infinite complexity of 'parts' of a design challenge, by drawing, first, upon its conceptual "whole."

Studio Activity and Philosophy

In brief, as projects were assigned, students were systematically encouraged to trust and build upon their pre-conceptions. Specifically, students were asked to capture and visually record whatever image(s) came to mind, at the instant of problem assignment, in whatever 2- or 3-dimensional medium(s) they chose. (Reflecting upon studio evaluations, it was quite apparent that students had been generally discouraged from this practice.) Students were also asked to put aside an almost reflexive use of "bubble diagrams." We did talk at some length about programmatic and functional relationships, but always within the context of an evolving "conceptual whole."
Throughout the studio experience, considerable 'self-critiqueing' was also encouraged. The overall quality of such critiqueing—developed and sustained via a triangular dialogue between student, teacher, and peers—was generally quite good. Studio evaluations suggest that this was the case, in great part, because students were able to talk openly and often about their intentions, their fears, and their continuing need to "honor their own ideals" as they moved through the various developmental phases of a project.

The fact that each student was encouraged to engage each problem at wherever point and place they chose to start, apparently also contributed to candid and open reflection. I am convinced, as well, that allowing each student to suggest his or her own route(s) of engagement, served to move each of them more smoothly through the predictable periods of undue self-doubting and "panic," so common to studio designing.

In general, I consciously sought to provide students with a number of opportunities to "panic" (typically, around requirements for intermediate 'due dates') long before their developing ideas were "officially due." In particular anticipation of the kind of conceptual paralysis that might develop, each student was required to present a completed whole of each project assigned, within the first week of assignment (ie, projects assigned on Monday, were due on Friday of the same week). Somewhere in the midst of this "fact-track thinking/development" process, a kind of conceptual liberation occurred. Evidence of this 'conceptual break-out' was rather obvious. First, a student would clearly begin to design less mechanically and more creatively. Doing so, the student gained greater confidence in his or her design abilities, which led to even more creative work; which, in turn, led to even greater design confidence ...and so forth.

"Ethics, Spirituality and Creativity"
Reflecting again upon studio evaluations, it is apparent that the genuine bonds of trust and goodwill established between myself and each student and between each student and his/her peers, was derived in great part, as well, from our continuing discussions of "ethics" and "spirituality." Our discussions about "ethics" and the nature of its role in design was particularly fruitful. Ultimately, we were collectively able to place its essential meaning and value within our standing concern for aesthetic quality in design. (Note, Glossary.) Our discussions of "spirituality" proved equally fruitful in reminding each student of his or her inherent designing capacities and, in so doing, encouraging each student to trust and tap his or her own unique well(s) of "creativity."

Design Principles and Conceptual Glossary
The design principles and glossary that follow were presented very early in the studio and were prefaced by the statement that they were not bounded by studio levels. In other words, the complexity of these principles and glossary were not to be understood as being either 'elementary' or 'advanced': rather, students were encouraged to engage them as "elemental" principles for designing to be applied in whatever ways they could imagine.
Spirituality: the source of our inherent (human) capacity to be self-motivating, self-directing and self-validating beings...the inspirational fountainhead for all that legitimately guides and directs our (individual) lives--our dreams, our aspirations, our ideals/our myths, our central beliefs, our fears...the deeper root that sustains our ethical-moral orientation, the source of our capacity for continuing (self) education and re-generation...
Architecture: a uniquely human creation that serves to give focus to our “spirituality”...inclusive of “design,” but considerably more; an enriching 'synergy' of (human) empowerment, ethics, vision, leadership, design and technology...a creative synthesis of material and human energy whose 'whole' exceeds the sum of its parts...
Empowerment: ...our inherent human capacity to make "power"; specifically, our capacity to create "opportunity"

(Personal)
Empowerment: ...an awareness* of our individual capacity for "power-making" ie. an awareness of our capacity to create new choices and new relationships for living, within the limits of our own personal resources and "vision(s)"...

(Social)
Empowerment: ...an awareness* of our capacity to 'make' power, drawing upon the resources beyond the limits of our own; specifically, an awareness of our capacity to create 'grander' relationships of opportunity by consciously joining our individual capacities and resources with those of others...

*Awareness gained through processes of "education" (formal and otherwise).

Power: ...the 'act' of exercising our capacities of "empowerment"; an 'act' which can be exercised through designs focused on manipulation and exploitation or through designs focusing on enlightenment and "liberation"...

Ethics: ...in a hierarchy of human "values," the most fundamental of our guides for exercising critical judgement; specifically, a framework for personal and professional decision-making based on our obligations toward others... the deeper root that sustains our moral fibre and our capacity to make distinctions of 'right' and 'wrong' conduct...the ORIENTATION for all that guides and directs our individual lives toward 'common' human purposes...

Vision: (beyond the act of sensing with the eye)...the translating of our empowering capacities into ideas designed to give practical DIRECTION to our ideals—ie., ideas which serve to make our ideals, real; specifically, the setting forth of a grander "unity" of ideas and relationships for fulfilling (unfulfilled) human aspirations...a prerequisite for the exercise of "leadership"...

Leadership: ...caring enough to 'act'; specifically, the act of seeking to make our "vision(s)" real...an inspiring exercise of "power"...

Design: (rooted in the empowering qualities of fresh IMAGINATION)...the instrumental medium through which "leadership" is exercised...a plan and process for guiding "change"...the conceptual medium for creating new "technology"...

Technology: ...the creative application of ideas and processes to develop tools, instruments and services for human advancement; specifically, a "unity" of idea, process, and implement directed toward practical human ends...the IMPLEMENTATION of human "design(ing)" powers...
Aesthetics: ...a fundamental expression of our human designing powers; an expression that includes, but transcends the 'visual' dimension; specifically, a unique expression of "quality" (in designing) derived from a transforming unity of visual, functional, and ethical harmony...

Change: A conceptual basis for seeing the world as, "reality in process...",
Explanations regarding the nature of "change" tend to flow from three primary origins:

(1) Change as "MAGIC"...unpredictable forces acting beyond human control...something which happens 'to' us...

(2) Change as "CONSEQUENCE"...a mere by-product of the shifting mechanical forces (ie, 'physical' forces) of Nature...something 'external' to us...

(3) Change as "DEVELOPMENT"...a view of the world as a reality being continually re-made and transformed via the systematic application of creative human energies...

Opportunity: ...a fundamental 'resource' for creating new relationships for living and new relationships for directing "change"

Liberation: ...that process of achieving fullest "opportunity" to construct one's own way of understanding and acting...a form of "freedom"

Freedom: ...fundamentally, an "opportunity" to create or to choose new relationships for living

Justice: ...the "reality" of impartial access to "freedom"; rooted in the ethic of 'fairness' and a fundamental respect for the worth and dignity of every human being...

"Stewardship": The challenge of taking "responsibility" to extend sharing/caring/trusting relationships beyond ties of family "Kin," beyond a broadened human network of extended-family "Friends" and beyond a "public family" of self-governing Citizens, into an arena of planetary Stewards...rooted in the idea of "human family" and a conscious quest for global harmony...
Design Principles

The principle of "Compositional Conception"
...honoring the 'flash' of the whole

The principle of "Nature's Way"
...massing and orientation for: 
prevailing winds
earthen insulation
natural lighting
natural ventilation
solar energies

The principle of "Heirarchical Clarity"
...what comes last, comes first

The principle of "Not Taking Sides"
...beyond fronts and backs

The principle of "Volumetric Carving"
...breaking out of the box
...articulating 'space between the notes'
...unifying 'inside - outside' relationships

The principle of "Asymmetrical Balance"
and
'Complementing Rhythms'
...avoiding the reality of 'draining parallels'
...mastering the art of achieving dynamic
(fluidity) beyond the fixidity
of static symmetry

The principle of "Minimal Horizontal Walls"
...respecting the vertical axis
...resisting the 'pan-caking' reflex

The principle of "Transferring Planes"
...partners in a dance

The principle of "Processional Entry"
...providing visual cues for 'extending welcome'
...an expression of delineated gradations
 of 'privacy' and 'invitation'

The principle of "Entry Celebration"
...of celebrated opening
(more than just a 'door')

Premises:
True architecture
possesses a poetic quality of 'spatial dance'
and
is attained only by giving creative attention to space between elements...

An understanding that while everyone
possesses the capacity for designing,
intellectual and intuitive leaps are required
to design well...
In pause: "Seeing Through the Mind's Eye" is put forward as a modest and complementary model for studio design; a kind of 'mini-paradigm' designed to achieve a more respecting balance between our applied powers of intellect and rationality and our powers of intuition and spirituality...

J. Chaffers
Before exposing students to real-world design issues, these studios attempt to teach basics in pure visual and spatial design. At this level, a more intuitive sense is developed through very specific exercises.

Reep first gives opportunities for students to find a simple purity and power of expression unaffected by extraneous factors as they learn compositional structure, experimenting with ordering principles within a given context. Armstrong and Poynter use a sequence of projects in the Bauhausian tradition, that simplify the paradigm to one of abstract manipulations. Students learn to deal with the fundamentals of balance, proportion, scale, rhythm and geometry, through additions and subtractions of lines and shapes which permeate their designs.
THE EXPRESSIVE POWER OF SIMPLE DESIGN FUNDAMENTALS

Professor Roxanne Reep
Savannah College of Art and Design
THE EXPRESSIVE POWER OF SIMPLE DESIGN FUNDAMENTALS

Professor Roxanne Reep
Savannah College of Art and Design

The execution of basic design fundamentals can yield a simple purity and power of expression which remains unaffected by extraneous factors that so often creep into the work of upper level students and professionals. It is essential that a design student's initial development be as an artist.

This paper is a presentation of student projects given in the first year, the so called foundation level, at the Savannah College of Art and Design. These projects which I have developed and refined over a period of years, are given in two courses: Three Dimensional Design and Color Theory. Included in this presentation are project descriptions, criteria, purposes and analysis. Two notions pursued extensively through the structure of my assignments are the concept of design flexibility in both the process and the final solution; and the nature of color as it relates to three dimensional space.

My experience indicates that the more successful student projects result from simple assignments that isolate selected elements of design within the problem solving criteria. A working vocabulary of the elements of design and principals of order are developed in conjunction with technical and material exploration to aesthetically realize the final solution. Compositional structure, or the context within which the student utilizes the elements of design, stems from the application of the principals of order as related to the problem criteria and project materials.

The intent is to instill in the student a sound fundamental design philosophy. Such a philosophy will serve the future designer in all artistic pursuits.
INTRODUCTION TO THREE DIMENSIONAL DESIGN PROJECTS

My primary objective in Problem I is to introduce the student to the principals of order and the elements of design. This vocabulary becomes the general criteria for the course and the guidelines used in designing. The definitions are historical terminology which I have included from a variety of design texts.

Problem I deals specifically with point and line within a confined 8" square space.

Problem II is also linear but has no boundary restrictions and the design is abstracted from an actual three-dimensional complex object.

Problem III is the final linear problem and is an abstraction derived from a non-material object - sound - and requires the student to restrict the design to include two lines that do not touch but form one integrated whole.

Problem IV requires the students to use physical (non-implied) planes to connect lines thus creating volume.

Problem V, the final three dimensional problem deals with mass utilizing for the first time a subtractive process of making rather than an additive process of construction as in the problems I - IV.
FOUNDATIONS DESIGN VOCABULARY

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1. Point - The most minimal visual entity which defines position (location) in space or decorates (activates) the surface. Having definite position in space but no size or shape; a location; a straight line is the shortest distance between two points. Three-dimensionally, a point occurs at the abutment of two or more lines in space.

2. Line -
   a. A mark left by a tool (pencil, chalk, gouge, etc.) as it is pulled or pushed across a surface; a trail left by a moving point; a row or series of points.
   b. Three-dimensional line is the edge of a dimensional plane in space. When applied to mass, line occurs at the abutment of two planes on its surface.

3. Shape - An area of surface made distinguishable from its surroundings by either a linear boundary or by a change in color or texture. A term usually applied to a two-dimensional area;

Plane - Three-dimensional planes are areas of surface defined by a more or less abrupt change in their direction. Planes may be flat or curved and are terminated by lines at the edge of space or in their abutment with another plane.
4. Mass - A three-dimensional unit of matter made visible through contrast to surrounding space. Mass has weight and density.

5. Volume - A three-dimensional area of space partially enclosed by planes or lines. Volume can be considered as a hollow or negative mass having no weight or density.

6. Color - The sensation resulting from stimulation of the retina of the eye by light waves of certain lengths; the property of reflecting light waves of particular length. The colors of that part of the spectrum which are perceivable by the human eye are red, orange, yellow, green, blue, indigo, and violet.

   Hue: The name of a color, position on spectrum.
   Value: Lightness and darkness (quantity of light).
   Intensity: Saturation or chroma (quality of light).

7. Space - An interval of distance made visual, comprehensible and measurable by establishment of specific points or boundaries.

   Three-dimensional space possesses length, width, and depth. Dimensionally space is that area around a sculpture that is given a sense of definition by the length, width and depth of the work.

8. Texture - The surface feel (tactile sense) of an object or the representation of surface character.

   Three-dimensional texture is the actual and "visual feel" of surface areas as they are arranged and altered by man or nature.

9. Time - A term used to define motion in kinetic sculpture. A period in time in which motion in a kinetic sculpture starts and later stops, or is observed.

**Principles of Visual Order**

A group of terminology used to describe how the Elements of Design might be employed in a two or three dimensional...
composition to achieve visual order: unity (harmony), variety, contrast, repetition, balance (symmetrical, asymmetrical, radial, occult) movement, economy, proportion, scale.

Unit (harmony). A visual unity or harmony used to establish a sense of order among the various elements of a design or composition.

Variety (contrast) represents the control of diverse elements within a design which adds visual interest to a design while maintaining a sense of unity.

Repetition - Design elements, motifs and patterns may be repeated in a given design to create an underlying unity.

Balance, symmetrical. Balance in which the two imaginary halves of a composition are identical. One half, in effect, becomes the mirror image of the other half.

Asymmetrical balance. Balance in which the two imaginary halves of a composition have equal visual weight but are arranged unevenly.

Radial balance. Balance achieved by arrangement of the elements in a circular pattern around a central core or point.

Occult balance. Balance in a design or composition which uses opposing and different elements to create a felt sense of balance.

Movement. In a design or composition movement is a visual devise most usually a single element which is distributed throughout the composition to create eye movement.

Economy. Simplicity in design. The employment of the design elements to achieve the maximum visual effect with the fewest elements employed.

Proportion - a visual size or weight relationship among structures or among elements in a single composition.

Scale - a visual size or weight relationship in a design or composition as measured by some standard, such as the human body.

Art Vocabulary (Form, Content & Subject)

FORM is a term which is used to refer to the totality of a work of art.

FORM is the end product of the organization of all of the elements of design in a given work of art.

CONTENT the source of which is FORM, is the expressive meaning of the FORM. The artist uses the elements of design as
a kind of formal language to bring content to his work, or in other words, to bring expressive meaning to his work.

**SUBJECT** is the theme represented in a work. Art works may or may not have subject matter represented. Generally when subject matter is included in a composition it contributes to the content of that work.
PROJECTS

Problem I: WIRE CUBES (3-D Design)

Purpose: To develop an understanding of how point and line may describe a plane and volume, and therefore occupy, activate, and pierce space.

Preliminary Exercise:

Lines may vary as to direction and position. Within a three-dimensional drawing of a cube, create four interesting line designs. One should be composed of vertical and horizontal lines only, one of diagonal lines, one of curved lines, and one of a combination of lines of all directions. Vary the length, thickness, spacing, and color of the lines so as to make the composition interesting.

Problem: A. Using 1/16" steel welding rods, construct 4 (four) 8" cubes.

B. Using horizontal and vertical lines (wire), occupy the space within the cube.

C. Using curved lines (wire), occupy the space within the second 8" cube.

D. Using diagonal lines (wire), occupy the space within the third 8" cube.

E. Using a combination of the above lines (wire), occupy the space within the fourth 8" cube.

Points to Consider:

1. Design in a logical manner
2. Space within is defined and articulated
3. Craftsmanship and a sensitivity to design and materials
4. Aesthetics
5. Relationship of parts to the total work

Materials:

20 1/16" steel welding rods
5 1/16" brazing rods
Propane Torch
Needlenose Pliers
Completion Time: three weeks

Project Analysis:

From the beginning of each project drawing is a primary consideration. In conjunction with drawing, students are taught to arrange linear wire materials in particular experimental spatial orientations. This type of flexible exchange with drawing is helpful to the student who is unable as yet to think three-dimensionally on paper.

The restricted eight inch working space of the Linear Cube is related to the paper format which most students understand from drawing. Stacking cubes, viewing the cubes from different angles, the impact of color, and the many options found when working from a seemingly limited criteria – are unique experiences students gain from the wire cube problem.
Problem II: LINEAR ABSTRACTION (3-D Design)

Purpose: To construct through the use of point and line a formal compositional interpretation of a complex object.

Preliminary Studies: Develop through drawings and linear (wire) studies in space a complete understanding of the structure of an existing complex object.

Problem: Use the elements of design found within the structure of a complex object as a basis for translation. The final project should be sculptural and an individual interpretation which is different from the original object in form. It is not necessary that the final project be recognizable in origination from the object, although this is acceptable if the student chooses.

The final project must, however, apart from subjective content and visual connections to the object, stand on its own sculptural merit as a structurally sound linear work which effectively uses space.

Points to Consider:

1. Analyze the structure of the object.
2. Consider the proportion and scale of the parts.
3. Create repetitions which may not exist in the object.
4. Take risks: shift or juxtapose given elements which exist in the original object. (angles, shapes, planes, proportions and orientation).
5. See the shapes and parts as line, point, shape, and volume. Disregard the function of the object and subject matter.
6. Be sensitive to the power and weight of unoccupied space.
7. Consider spatial tensions, rhythm, collected areas vs. less collected areas.
8. Variety, repetition, contrast, space.
9. Be aware of the base as a plane which must work in conjunction with and supportive of the piece. The edges of the base will often create exciting spatial tensions within the work, if sensitively considered.

10. Realize that all points or areas of a work should not command the same attention. Therefore, consider the value of primary, and then secondary focal points. Two repetitious elements of the same linear weight can create a stronger point of emphasis than a single element. The space between these elements is a powerful tool. Use it!

Materials:

- 5 1/16" steel welding rods
- 5 3/32" steel welding rods
- Propane torch, needle nose pliers, metal files
- Sandpaper, enamel spray paint, for the wire,
- Latex paint and wood filler for the base.

Completion time: One week.

Project Analysis:

The ability to think and see abstractly is extremely important for the art student. Without this they become tied to function and subject matter unable to see and understand pure form.
Problem III: **VISUAL SOUND** (3-D Design)

**Purpose:** Using two wires which never touch interpret a sound into a visual linear image.

**Preliminary Studies:** Identify the sound. Describe the considered sound on paper exploring various weights and tensions between the 2 lines. In the final drawings use color. Consider the visual weight of color (hue, value, and intensity) and various color relationships.

**Problem:** The two lines (wires) should not physically touch, yet should interact to create a unified harmonious form. The essence and expression of the sound should be developed through the compositional structure of the wire and reinforced through the application of color.

**Points to consider:**

1. Spatial tensions.
2. Rhythm, variation, repetition, simplicity
3. The interrelationship of line to line in creating visual complexity.
4. The relationship of color to linear weight and spatial tensions.
5. The power of color to complicate and simplify.
6. Purity of expression.
7. Dynamic vs. Static.
8. The base as an integral supportive mass.

**Materials:**

2 1/16" or 2 3/32" steel welding rods
1 1/16" brazing rod
Propane torch, Needlenose pliers, metal files, sandpaper
Enamel paint (spray) -wire
Latex paint and wood filler - base.

**Completion time:** One week.
Project Analysis:

The movement, rhythm, and inherent nature of sound usually yields a more dynamic visual solution than other assignments. This problem enforces the concept of "less is best". The student must understand spatial tensions, rhythm, and the dynamics of two simple linear elements in space.
Problem IV: **PLANEAR CONSTRUCTION** (3-D Design)

**Purpose:** To construct a volumetric three-dimensional form through the use of point, line and plane.

**Problem:** Make a strong formal statement by constructing interacting planear configurations into an exciting three-dimensional form. Connect planes to create volumes and alternately use line and plane to pierce and redefine volumetric space creating open architectural tensions. Understand that planes not only define space but may pierce space as well. Design in a sensible and logical manner. The piece should be structurally sound and self-supporting. The piece may be built of one singular unit, or be developed from interlocking separate units which may exhibit a variety of compositional options.

**Points to Consider:**

1. Analyze the structure of a volume.
2. Discover the strength of geometric simplicity and architectural shapes.
3. Create exciting spatial tensions between lines and planes.
4. Be aware of line as the edge of a plane and use this to your advantage.
5. Avoid decorative lines and planes having no sculptural bearing on the overall piece.
6. Indicate the gesture of the form: movement.
7. Use interlocking planes both visually and structurally.
8. Unarticulated space must be dealt with in a positive manner.

**Materials:**

- 1/16" steel welding rod
- 1/16" brazing rod - to braze
- Black fiberglass flexible screen wire mesh
- Black thin (strong) fishing line or thread
- Base: wood, concrete, marble or other options dependant upon the work.
Vocabulary:

Line
Plane
Mass
Volume
Form
Point
Shape
Time
Scale
Space
Construction
Abstract/Abstraction

References:
Naum Gabo First Constructed Head
Theo van Doesburg Card Players
Jean Arp Fleur Marteau
Mountain Anchors Navel
Pablo Picasso Three Musicians
Head of Fernande Olivier
Jean Gorin Composition No. 8
Anton Pevsner Portrait of Marcel Duchamp
Construction In Space
Projection Into Space
Developable Column
Dynamic Projection In The 30th Degree
Barbara Hepworth Group III
Lynn Chadwick Two Seated Figures
Jacques Lipchitz
Alexander Archipenko
Marcel Duchamp
Umberto Boccioni
Constructivism read pages 238-240
The Spread of Cubism read pages 193-240
History of Modern Art second edition, Arnason

Project Analysis:

The planear project requires the student to allow the work to evolve during the
working process. Planes occupy such a different space from lines that the student is usually not capable of visualizing the results of the final solution. Structural (physical) soundness is a necessity. The student must learn the applicable physics of structure in the company of aesthetic considerations.

Completion Time: Two weeks.
Problem V: SHAPE/PLANE/MASS - THE MONOLITHIC OVALOID (3-D Design)

"It was on the southern coast of Jamaica where the rivers have alabaster stone that I first saw the children grind the alabaster stones against other rocks to make an oval object which they could market or sell to tourist. The name monolithic ovaloid was a misnomer for one single object. This project and variations thereof have been assigned since 1967."
- John Satterfield

Purpose: By using the subtractive method, develop a three-dimensional single mass consisting of two to three compound-convex planes. Realize that a line is the abutment of two planes. This should be an object which encourages the viewer to pick it up and turn the object over in his/her hands. The object should fit the hand when held, i.e. feel comfortable. The simpler form is the more elegant.

Points to Consider:

1. Excellence in craftsmanship.
2. Realize that a single line defines two planes and may actually end where the planes melt together.
3. Consider the speed, grace and movement of a line. (Rhythm)
4. Lines should be so graceful and crisp that one could imagine being very small, sliding down this line, encountering no bumps, irregularities, or surprises.
5. Consider Subordinate/Dominate planes and lines.
6. There should be no discernible top, bottom, or sides.
7. The form should be visually pleasing from any view.
8. Consider Cast Shadow.
9. This object will not require a base or support.

References: Constantin Brancusi and River Rocks
Preliminary Studies:
1. At least 10 working drawings.
2. A plasticine maquette/or model of the completed form.

Materials:

Toned paper 18" x 24"
Conte crayon or charcoal (at least 3 shades)
Compass, lead - drawing kit
No. 1 molding plaster - purchased by class
Surform - Auto supply store
Sandpaper - Auto supply or student supply
1) Medium grit wood sandpaper or 200 wet/dry sandpaper
2) 400 - wet/dry sandpaper
NEWSPAPERS - A small stack to use during class as you carve your plaster.
2 Ziplock 6" freezer bags
Roma Plastillina or Plasticine - Student supply store
Lacquer sanding sealer - any hardware
Lacquer automobile primer spray paint (2 colors)
Lacquer automobile spray paint (Avoid hot-rod day-glow colors and yellow.) Consider the form and what colors work best on sculpture, specifically a single mass. Rubbing compound.

Vocabulary:

1. Convex - curving outward like a segment of a globe or of a circle; bulging out; opposed to concave
2. Concave - Hollow and rounded, as the interior of a sphere or circle; incurved; opposed to convex.

Completion Time: Three weeks

Project Analysis:

Students develop a great affinity for these objects and a special awareness of the purity and grace which can exist within mass and form. I have used variations of this project since 1980.
INTRODUCTION TO COLOR THEORY PROJECTS

In the color theory course I spend the first five weeks teaching traditional color mixing theory, understanding of the hue positions, and the effects of value and intensity. I also introduce the student to consistent handling and control of pigment.

In the second five weeks, I use one of three color problems: The Color Cube, Problem VI; The Cube Construction, Problem V; (problems which I developed) and The Puzzle, Construction in 3-D, a variation of a project I was given as a student. Each problem takes the entire five weeks, therefore, I select one problem best-suited to the needs of the class. In each of the three problems, I emphasize the use of color within space, and the flexible arrangement of the painted (color) sections. My intention with each of these problems is to maximize the number of color and design options available within the context of the finished project. These options identify endless compositional variations; each effected by spatial, color, and design relationships.
PROJECTS

Problem VI: THE COLOR CUBE (Color Theory)

Purpose: To explore the interactions of space and color relationships.

Preliminary Drawing Studies: Develop a two-dimensional composition, which has a strong figure/ground relationship. Do preliminary drawings of the selected subject on tracing paper. Each drawing should be an 8" x 8" format and the composition should vary each time to develop the strongest figure ground study.

Box Construction: The Color Cube is an 8" x 8" box, built of Strathmore Board (500 lb.). The cube should have an opening designed on the front and back. The top is initially left open to enable (7) 8" panels to slide inside of the cube. Each panel will face the open front and back of the box. The sides of the box structure may be constructed with slats which hold the panels stationary and upright. These slats determine the distance between each of the seven panels. Slats may be stationary and glued to the internal sides and bottom of the box or made flexible like the panels so they can be rearranged. The distance between panels is left to the demands of each individual design.

Panel Construction: Each panel should be designed to include negative opened space. This open cut space enables all seven panels to be in the box together and be viewed at one time, even though various parts will be hidden during particular arrangements. The initial objective is that all panels work together in their cut shapes (unpainted) to create a new unified total image. To develop successful panels, use tracing paper in actual 8" format size to design and cut various panel ideas. Stack the tracing paper to determine interesting shape configurations. Create many different options. The more the better. Layers are interchangeable. Finally cut the panels out using strathmore board (500 lb.), balsa wood sheet and square stock and/or use 1/16" steel welding rods for linear additions.
Color Application: A minimum of seven panels is required, however students may do as many as the design flexibility merits. One of each of the following fourteen color systems should be applied to one side of each of the seven panels. Use acrylic paint and remember to paint all edges neatly.

1. Monochromatic 8. Romantic
2. Analogous 9. Classical
3. Complementary 10. Local Color
   two pure hues, side by side
6. Simultaneous 13. Transparent/contrast opaque

Problem: The project is complete after each panel, the box sides, and a designed top are painted. All color and design considerations should be developed based upon the needs of the total design form. The final critique presentation of the project will last three minutes. Each student will, without speaking, demonstrate before the class the inherent compositional options and color changes that occur when the order and orientation of the panels are rearranged. Professor and class comments follow each presentation.

Points to Consider:
1. Craftsmanship and sensitivity to design and materials.
2. Continuity of design.
3. Relationship of parts to the total work.
4. Design in a logical manner.
Materials:

Acrylic paint, glass palette, brushes
Tracing paper, strathmore board (500 lb)
Exacto knife, #11 blades
Drafting tape, ruling pen
Krylon Clear Acrylic spray, Gloss gel medium
Elmers Glue
36" metal straight edge
Metal T-square

Completion Time: Five weeks
Problem VII: THE CUBE CONSTRUCTION (Color Theory)

Flexible Compositions in Color and Form

Purpose: To explore the effects of color on three-dimensional forms which are flexible in composition and construction.

Problem: Construct an eight-inch cube composed of three separate units which can be rearranged and stacked to create a variety of compositions using color and space. Each unit will be painted using different aspects of color and color systems. The final product is the strongest working combination of the three units. The individual student's cube (three units) will then be combined with additional cubes in the class to create even larger and more complex modular towers. Many compositional variations will be possible both in the final stacking and when designing each piece.

Color Options:

A. Monochromatic (change in value)
B. Analogous
C. Complementary
D. Triad (secondary or intermediate)
E. Simultaneous Contrast
F. Spatial Illusion To Enhance The Form
G. Pattern To Deny The Form
H. Your Choice/Combinations Of The Different Color Systems

Points To Consider:

A. Avoid random fractioning of the form with color
B. Solve the specified problems yet maintain a sense of design.
C. Colors and surface design should enhance the totality of the three-dimensional form.
D. Many variations of intensity.
E. Avoid tube colors. Mix paints to achieve neutralized colors.
F. Value organization.
G. Interaction Of Colors
H. Sensitivity to the composition of each unit.
I. Craftsmanship in construction, as well as mixing and articulation of the paint (brush work).
J. Be aware of the compositional variations possible.

Materials:

Pencils, Mat Board, Acrylic Paint, Brushes, Fast Dry Elmers Glue, Cutting Tools, Drafting Tape, Palette, Water Container.

Completion time: Five weeks.
Problem VIII: PUZZLE CONSTRUCTION IN 3-D (Color Theory)

Purpose: To develop an exciting 2-dimensional design which can be physically taken apart and built to create an exciting 3-dimensional form.

Problem: The 3-dimensional form should be designed to occupy a space on the remaining 2-D format which compliments the 3-D form creating a visually exciting totality. The pieces should be painted to enhance the 2-D and 3-D design. The spaces in the 2-D format from which the pieces are removed may be painted identical to the pieces or differently, depending on the individual design. A one inch border is required and painting of uncut areas on the illustration board is optional.

Preliminary Studies: (color layouts using Bristol Board, to be mounted on Biology Filler paper).

(1) Two puzzle pieces, actual size painted to show color combinations or choices.

(2) Painted layout of puzzle before removal of pieces.

(3) Painted layout of 2-D format after removal of puzzle pieces (if different).

(4) Additional combinations should be documented as well.

(5) A drawing with applied color showing the most dynamic view of the 3-dimensional form constructed.

(6) Neat color notations on layouts are desired.

Points to Consider:

(1) Spray the cut pieces with Krylon Clear Acrylic spray (preferred) or spray shellac before and after painting to avoid warpage. Remembering light coats are all that is needed.

(2) Slots or other joining mechanisms should be an integral, visually exciting part of both the 2-D and 3-D design.

(3) Puzzle pieces should be physically and technically strong. (Ability to be reworked any number of times).

(4) Allow ample time for completion in case unexpected design problems occur.
(5) Craftsmanship is a must.

(6) Smooth paint application is desirable.

(7) Keep accurate records in sketchbook on ratios of each color mixture.

Materials:

1. Illustration board 11" x 14" or Strathmore Board (500 lb.)
2. Acrylic paint
3. Brushes and water container
4. Ruling pen
5. Drafting tape
6. Straight edge
7. Palette (glass)
8. 18" x 24" glass (taped edge)
9. Krylon clear acrylic spray and gloss gel medium
10. Sharp mat knife or Exacto knife w/ # 11 blades

Completion time: Five weeks.
CONCLUSION

In addition to establishing a fundamental vocabulary and learning through the design process a new way of seeing, I have discovered that students learn a great deal from one another when not limited by a rigid focus or discipline. An interdisciplinary exchange naturally occurs when artists, designers, and building arts majors attend classes together. The variety of interests and disciplines support the notion of design flexibility and discovery. I have found, for example, that some architecture students have misguided notions about what architecture can be. Some feel that architecture must be very rigid and predictable. In the company of other art students, freer, more flexible design solutions can be developed all in the name of aesthetics.
The Perceptual Order of Figures within an Orthogonal Field:
Two Projects

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School of Architecture
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THE PERCEPTUAL ORDER OF FIGURES WITHIN AN ORTHOGONAL FIELD:
TWO PROJECTS

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In 1939, Mies van der Rohe brought a relatively unknown Bauhaus master to teach at the Armour Institute in Chicago. Mies needed a disciplined teacher who had exceptionally high standards, a visual thinker who had tested technical skills, and a well-educated person who could build a basic design curriculum upon a philosophically sound basis. Trained in mathematics and philosophy, Walter Peterhans was a photographer of unsurpassed technical skill and just the person Mies required to institute the Visual Training course. Peterhans' Visual Training exercises became the hallmark of the basic design education at the Armour Institute in Chicago, later to become the Illinois Institute of Technology.

Peterhans developed a series of two- and three-dimensional exercises based on figure/field (or figure/ground) relationships in order to teach students lessons about the creation of form, proportion, color, texture, and space; Peterhans wanted the exercises "to present visual qualities and relationships in a pure form." Visual Training is founded on a platonic concept that beauty is subjective rather than objective and that the role of education is to awaken the subject to his or her own insight. In Peterhans' words, the exercises were "to be abstract enough to reveal visual qualities isolated from one another" and "raised out of the manifold involvements in which they generally occur in architecture, in industrial forms and in the fine arts."2

Although not literally based on Peterhans' Visual Thinking exercises, the Orthogonal Design exercise, which is the first of two projects to be discussed here and is currently the initial project for beginning design students at the University of Illinois at Urbana-Champaign, is premised upon similar principles of proportion, form, scale, and spatial thinking as those developed within Peterhans' course. The ability to understand and "see" the composition of two-dimensional elements as representing a construct in three-dimensions is a skill which is developed through experience and time. For the beginning design student—who is confronted with a plethora of design issues, and who is generally equipped with an extremely limited vocabulary and an even less developed spatial and compositional capacity—even the subtle perception of the interaction of figure and field can represent a relatively sophisticated understanding of spatial relationships depicted on the two-dimensional plane.
The purpose of the Orthogonal Design exercise was to explore, develop, and intensify compositional and spatial relationships throughout a progressive series of eighteen figure/field diagrams. Students were asked to develop each diagram or composition within a four inch square (field) and organize it with respect to a fixed matrix or grid. Three series of compositions, each consisting of six squares, were themselves composed in three horizontal rows on a 15"x30" illustration board. Each series began with the composition of a single-line figure within the field, with the next three subsequent diagrams in each series progressively adding one line per composition, so that by the fourth "square," students were to have developed proportionately related compositions of figure to field. In the first row, compositions were normal to the field's orthogonal matrix, retaining the relative horizontal and vertical orientation of the matrix, which itself was normal to the square and to the overall composition. In the second row, the matrix was rotated with respect to the square, and the second series of compositions (distinct from the first) was developed with respect to this rotated grid; while the third (and final) series combined the "normal" and rotated compositions. The fifth and sixth diagrams in each row were implemented to allow students the opportunity to graphically evaluate and/or intensify the final (fourth) composition in each series through figure/field reversals and tonal studies. By reversing the figure and field in the fifth diagram, students were able to more readily perceive and demonstrate the success of their figure/field compositions, as the inherent ambiguity and reversibility of the figure and field were considered essential to the success of the figure/field relationship for this exercise. The sixth square of each series allowed students the opportunity to work with varying tonal values and apparent textures in order to further develop or even to exploit the spatial and compositional qualities of their figure/field series.

The phenomenon of figure/field perception and the value of graphic and spatial composition skills are generally understood and universally accepted as important or at least very useful tools to be used in the instruction of architectural design. The Orthogonal Design exercise recognizes the primary need for the development of such skills, but also includes a number of more subtle interpretations which presage processes and perceptions that will eventually become standard articles in the architect's approach to design. For example, as students began the project (literally from square one) there tended to develop the different series lineally, which was not unreasonable, but which often led to undesirable results when they proceeded to the third series, which combines or overlays the first two. The subsequent necessity of working backwards as well as forwards—the iteration and cyclic replication necessary to have successfully completed all three series—gives the students a relatively clear if not yet comprehensive indication of the design process; it compels them to consider the overall consequences of what they do initially and helps them to realize that a linear process is not necessarily the best and certainly not the only cognitive process useful for design development. The project also serves as an introduction to abstraction and perceptual development; it
demands from them a departure from the expectations based on the drafting-and-house-model-building class they took in high school and allows them the flexibility of creating something that can be interpreted in various ways. Their compositions, which can be perceived as both two- and three-dimensional constructs, are in some ways similar to and introductory to the plans, sections and elevations with which they will soon be preoccupied, but gives them the freedom to create and to experience and, it is hoped, to learn. As the initial exercise in a first semester studio, addressing students who, as we have noted, generally shy away from abstractions and who have come to their studios with what to them seem more practical expectations, the response from students was very positive, and the results of the project itself were outstanding. We were greatly encouraged by starting the year on such a promising note. The real value of the exercise as to its effect on the students is of course more difficult to measure, but we are convinced that they will come to appreciate it as they continue to develop the graphic, perceptual and compositional skills initiated through this project.

Our second project, ROMA (or “the Rome Model”), was a continuation of the figure/field exercises; however, in this case the emphasis was placed upon the recognition and perception of existing spatial relationships rather than upon the creation of them. It was also intended as an initial exercise in model building and office (group) management and communication. As a figure/field exercise, ROMA extended the two-dimensional relationships of figure and field considered previously into a graphic and diagrammatic representation of urban form translated into three-dimensions.

The plan of the city of Rome was first subdivided into a grid consisting of 663 squares, each 1 1/2"x1 1/2"; these squares were then divided among eight design studios, which all met at different locations and at different times in the day. Each student was assigned four or five of the squares, and was responsible for interpreting what was represented on them in plan, redrawing and enlarging each square to 7"x7", and constructing each square in model form utilizing a field (space) of black electrostatic board under a figure (mass) of a uniform thickness of white foam-core--an abstraction of Rome's built form which was both necessary and useful, given the project's scope and purpose. The squares were mounted on interlocking bases of foam-core and then assembled--the final model measuring approximately 14'x18'.

The students were responsible for the coordination of the project in its entirety, both within each studio and between studios. The decisions and issues faced by studio managers and their committees involved the initial assignment of squares (and resolution of the inevitable conflicts resulting from the many building masses occupying territory on two or more adjacent squares); the degree and nature of the abstraction involved and the material to be used in the representation of various elements such as aqueducts, ruins, walls, bridges, and the river; and the communication of essential information to other studio sections.
In addition to the important, yet perfunctorily simple, topics of organization and model building the project allowed for the additional opportunity to address figure/field within an urban context, including discussions on the nature of urban spaces, spatial definition, interior and exterior spaces, patterns, circulations, etc. The already substantial complexity of the ROMA project, as well as limitations in time, information, and resources kept us from including topographic representations in the model; such considerations may have given further interest to the model, but even as a relatively flat bas-relief, the figure/field relationships of Rome were recognized, understood, and communicated quite clearly, and students could hypothesize about the effects that topography might have on mass/space relationships and perceptions. Students also were able to recognize a sort of synergism in terms of both energy and scale. They became aware of the relative simplicity of completing the model as a group, compared to the impossibility of executing such a project individually, especially when weighed in terms of the two commodities most dear to architecture students (and to us all): time and money. Interestingly, students also noticed some of the seeming incongruities of scale in this project: how their small, simple squares formed a large, complex composition when placed together; that what is clearly (and literally) black and white when taken in part (one square) can take on different values and lesser contrasts when taken as a whole; that the effect of the greater whole can be drastically affected by the elimination or removal of just one small part, etc. In addition, the scale of the project helped to create a sense of curiosity and excitement within the studios from the inception of the project and contributed to a heightened satisfaction when the students were invited to assemble the model in the center of the Temple Buell Architecture Gallery as part of a comprehensive student exhibit for Homecoming, 1987.

NOTES


2. Ibid, p. 22.
ORTHOGONAL DESIGN
National Conference on the Beginning Design Student (5th : 1985, Albuquerque)

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Figure / Field Permutation: The Cubist Syntax

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The iterative process of drawing or modeling, critiquing, and redrawing or remodeling is the fundamental pedagogical tool of architectural design education. The empirical testing of an idea (in two- or three-dimensions) and its consequent transformation through a progressive series of discreet, yet interrelated, steps or intervals is the formulative basis of the design process. It is only through the physical manipulation of two- and three-dimensional shape, form, space, and volume that the beginning design student can develop an appreciation of the subtle nuances of form, scale, proportion, composition, rhythm, et al. In the Figure/Ground Permutation exercises, each individual transformation becomes, in a sense, a mnemonic device; a recollection of its previous state slightly altered. Its cumulative effect is residual, each fragment compositionally integrated to form a unified whole—a gestalt of discreet parts.

The architectonic analogue of a two-dimensional graphic abstraction, such as the Permutation exercise, is not entirely metaphorical. In Western art and architecture a demonstrable relationship can be shown to exist between the Greek concept of space which relates a Greek temple to its physical environment in a simultaneous "reading" of figure and field, object and vista, and the spatial reordering of the two-dimensional picture plane as defined by Cubist art and thought at the beginning of the twentieth-century and continues to influence contemporary critical thinking in art and architecture.

Comprehension of the structure of a visual field is assisted by the organization of heterogeneous elements into two opposing groups: positive elements that are perceived as figures, and negative elements that provide a background for the figures (field). The perception and understanding of a composition depends on the interpretation of the visual interaction between the positive and negative elements within its field. This phenomena can be illustrated by letters seen as dark figures against the white background of a sheet of paper, and thus we are able to perceive their organization into words, sentences, and paragraphs. Likewise, an individual letter is seen as a figure, not only because it is recognizable as a sign (a letter of the alphabet), but also because its profile is distinct, its value contrasts with that of its background, and its placement isolates it from its context. As the figure grows in size relative to its field, however, other elements within and around it begin to compete with our attention as figures until the relationship between figure and field becomes so ambiguous that we can visually switch their identities back and forth almost
simultaneously. Therefore, figure and field form an inseparable reality, a "unity of opposites," just as the elements of form and space together form the reality of architecture.

The relationships between figure and field can be ordered by geometry (i.e., the grid) and/or by topology. The Greeks, for example, employed both ordering systems: the grid for town planning and topological organization for temples and sacred places. Christian Norberg-Schulz postulates that the seemingly haphazard and irregular distribution of Greek temples, and the arrangement of space outside buildings, have led some critics to the conclusion that Greek buildings are "nonarchitectural" and have to be perceived as "large sculptures." Although the temples appear as clearly organized individual bodies, this unsatisfactory interpretation of the siting of Greek temples is probably due to the use of insufficient space concepts.

Vincent Scully, for the first time, brought the Greek Temples to life as individual concretizations of fundamental existential situations. Whereas the beauty of the temple as an aesthetic object has resulted in interpretations in terms of stylistic development or as an expression of the wish for visual refinements, it is essential to understand the temple in relation to the total situation under which it was created. That is, it had to be related both to its site and to the purpose it had to serve. Scully confirms the generally recognized fact that the regular buildings and the free distribution are complementary aspects of the same basic intentions. Furthermore, he also explains this intention in terms of Greek religious and philosophical concepts.

Greek sacred architecture is, basically, an architecture of plastic bodies and that their seemingly haphazard distribution has a meaningful spatial function in relation to the surrounding landscape. However, it is evident that the implied spatial organization cannot be described by means of the concepts of geometry and symmetry which determine the individual Greek building, and which are employed to describe spatial relationships. Greek space is therefore characterized by its "heterogeneity." It is determined by a multiplicity of modes of organization, unlike Egyptian architecture which is ruled by the same laws on all environmental levels. Therefore, Greek space is ordered "topologically" where organizational modes interact in different ways according to the particular situations, producing totalities which have a pronounced individual value within a general system of related meanings.

The purpose of the Figure/Field Permutation exercise was to explore the simultaneous visual interaction of figure and field, "a unity of opposites," through the dynamic interpenetrations of geometric shapes organized on a field using regulating lines and orthogonal ordering systems. In Cubism, the relationship between figure and field is unified through the simultaneous perception of forms in space and their composition within the two-dimensional picture plane of the canvas. The consequential spatial ambiguity is a result of the simultaneous
observation of form from different perspective vantage points and the corresponding translation of the perceived realities to a two-dimensional field. The spatial field tilts, objects are viewed simultaneously in plan, elevation, and section, and the classic distinctions between figure and field are blurred as the figure and field merge into a comprehensive compositional structure.

In order to fully appreciate the syntatic expression of Cubism, one must understand the contribution to Cezanne. Judith Wechsler writes, Cezanne conceived of painting as a way of realizing his sensation before nature and not as a problem in abstract composition. The subjective element of his painting was asserted as a "way of seeing," rather than an imposition of mood. Cezanne revealed how we come to see reality when the various schemata of our vision and painting are rejected. At the same time, he created a new unity and cohesiveness of composition by laying bare the elements of color relationships and space definitions. He bound color to structure, surface to depth, form to content, process to realized work. In so doing, Paul Cezanne evolved a new syntax for painting.  

Cezanne was not concerned with traditional illusionistic representation but rather with "realization" through new means of "organization." "To paint after nature is not to copy objective reality but to realize one's sensation." In order to bring about this realization, Cezanne was faithful both to the object's visible reality, the perception of which was the product of his "brain," as well as his "eye," and to the means of painting.

A fundamental Cubist view of Cezanne held that his art was based on his concern with the process of perception. Cezanne was the first to paint the consequences of selective focus at the same time that he was concerned with his grasp of the whole which united these multiple focuses. Cubism was based on the notion that the fragmentation of objects and space as a means toward reality, rather than a barrier to reality. The Cubist understanding of the question of focus and the evocation of wholeness cleared Cezanne of the accusation that the could not "realize" a painting.

According to Leo Steinberg, the crux of the problem for Cezanne, and for the Cubists at the initial stage, was how to translate fragments of three-dimensional space into facets of the two-dimensional picture plane. The 1907-1908 paintings of Braque and Picasso, the founders of Cubism, revealed their logical development of Cezanne's precepts in the use of "passage," flat planes, shallow depths, and shifting perspectives. The way Picasso and Braque integrated three-dimensional vision with a two-dimensional surface not only stated a further development of Cezanne's pictorial structure, but implied that we come
to know reality not through a single static position in space, but through shifting and successive perceptions.

In the Figure/Field Permutation exercise, students were required to compose paired geometric shapes or "figures" (i.e., circle and triangle, half-circle and square, square and parallelogram) within a series of six inch squares or "fields" organized on a 15" x 20" illustration board. To ensure geometric harmony, each shape was to be proportionally related to the field. The proportional relationship of the figures to the field and their compositions within the field were to be defined through the implementation of regulating lines and orthogonal ordering systems.

The implementation of the regulating lines assured that the individual geometric shapes would be proportionally derived from the geometry of the field and also allowed students the opportunity to explore non-orthogonal spatial ordering systems. By retaining the regulating lines as compositional elements, the simultaneous expression of the unity and integration of figure and field was realized. The simultaneous interaction of figure and field and the implications of the design process were further explored through permutation and transformation of the composition of each of the eighteen squares.

Frank Ching writes that all other forms can be understood to be transformations of the platonic solids and that the variations are generated by manipulations of their dimensions, or by the addition or subtraction of elements. Once the figures with their regulating lines were composed within each square, students were given a palette of three values of grey plus black and white to apply to each composition. Each composition was conceived as a permutation of the previous composition. With the addition of the tonal values, students could investigate a dimensional relationship implied through the articulation of interpenetrating planes. The use of the regulating lines as a compositional matrix suggested the two-dimensional continuity of the figure within the field through their extension to the perimeter of the square. Composite layers of geometric planes began to suggest transparency, intersection, overlap, and continuity within the spatial field which could be defined through a systematic application of tonal values. Heterogeneous compositional pieces could be unified and articulated through discreet placements of tonal values for compositional and spatial effect. The result was a harmonious network of lines and planes compositionally unified by the convergence of figure and field and balanced by proportionately distributed tonal values.

Then, what is one to make of the structured ordering of the spatial field into tonal values (representing spatial depth clues) if there exists no "a priori" ordering system—no "reality" beyond that of the picture plane? Perhaps an analogy can be construed in Jasper Johns' drawing, 0 through 9 (1960). The drawing is literally the stenciled outlines of the numbers of 0 through 9 superimposed one over the other on a single sheet of paper. Each number is drawn at the same scale and in the same typographic style. The superimposed numbers fill the picture plane from
top to bottom, from edge to edge. Steinberg calls the viewers attention
to the fact that the title is not "0 to 9, but through--to intimate that
succession has given way to transparency and superposition .... But
'superimposed' is the wrong word; it suggests stratification. And the
point about these numbers is that they exist simultaneously in the same
single stratum. 10

Whereas Johns has neutralized the hierarchical prearranged pecking order
by annulling the seniority rule among numbers (treating each figure the
same way without modeling or value), the students were asked to impose a
hierarchical reading of depth through values of grey, white, and
black. The resolution of plane and value is an experiment which is
dependent upon several variables. Since a "reading" of the figures must
be retained, the addition of values may obfuscate, but not nullify, the
original geometries of the paired shapes. The shapes may be "fractured"
by their regulating lines and superpositions on the field, yet they may
not be obliterated. And ultimately the integrity and harmony of the
compositional balance must be retained within the field; the addition of
each value must be correspondingly balanced within the composition to
maintain the unity of the spatial field. Only through an empirical
process of iterative discovery can the appropriate compositional balance
be achieved.

The models carry the rationale a step further. Initially, the models
are based upon almost a literal interpretation of the implied spatial
depth of the value-ordered planes of the graphic permutations.
Tautaulogically, we learn that black "recedes" and that white
"advances;" therefore, a white plane or shape may be interpreted as
"floating" over a dark background. The literal interpretation in three
dimensions of the graphic exercises yields to further transformation as
one applies the empirical methods used in the compositional ordering of
the graphic squares. As the student translates the two-dimensional
diagram into its implied three-dimensional counterpart new questions and
possibilities arise. Are the planes assumed to be flat (as the
constancy of the tonal values might suggest) or may they be tilted? Is
a line to be interpreted as a coincident edge between adjacent forms or
does it represent a plane viewed on edge? Once again there is no "a
priori" logic which dictates a precise answer. Only through
experimentation with the massing of forms and planes in three dimensions
can a "solution" be achieved.

Cezanne's painting, which reveals the way he builds up an object through
his perception (through repeated lines, multiple vantage points), has
had substantial effects on contemporary sculpture. Unlike painting
which sought to resolve the unification of figure and field as a
simultaneous expression of multiple vantage points in two dimensions,
cubist sculpture was principally concerned with the figure itself. In
sculpture, space is a literal, palpable phenomenon and the interaction
of the figure within a field, its spatial context or environment, is
immediately perceptible. Cubist sculpture creates dynamic, three-
dimensional juxtapositions of forms and planes as objects seem to
fragment and reassemble in relief or twist and rotate upon themselves in space. As in Cubist painting, Cubist sculpture assumes a faceted, fragmented appearance as planes abruptly shift, overlap, and converge.

In Cezanne, A Study of his Development (1927), Roger Fry called the constructive quality of Cezanne's painting "pictorial architecture." Cezanne’s use of colors may be understood as modules: like notes in music or bricks in building which have an independence as constructive elements. The independence of the constructive elements allows for new criteria of composition based on autonomous formal relationships. An "austere and impressive architectural construction" emerges from what at first looks like "the impression of some vague patterned carpet or embroidery." The architectural construction must imply the existence of the third dimension but it is there only in the service of the pure plastic idea.

Perhaps the most convincing and original integration of the Cubist principles of spatial organization with architectural form were the "Merzbau" sculptural environments constructed by Kurt Schwitters in his house in Hanover between 1924-1933. Although the "Merzbau" does not exist today, photographic documentation attests to the comprehensive development of a prototypical Cubist architectural/sculptural environment in which the conventions of figural space—a uniformly proportioned space "contained" within or defined by a regular, orthogonally derived geometric order—are subsumed by irregular, ad hoc juxtapositions of forms and planes which no longer conform to the spatial conventions of floor, wall, and ceiling.

Although highly idiosyncratic, Schwitters' improvised sculptural environments synthesized the intrinsic relationships of sculptural expression with architectural form. As William Rubin asserts, with the blurring of the discreet pictorial field of the collage on the wall and the extension of the relief material into the room, Schwitters' improvised environment gradually obliterated the architectonic sense of the house. The "merz" accumulations began to be surrounded by an organic growth of wood and plaster which in time extended through two floors of the building and down into the cistern. As this shell was realized it became increasingly Constructivist in style, in keeping with the general orientation of Schwitters' art in the mid-twenties. Schwitters' "Merzbau" anticipates by nearly half-a-century the combines of Robert Rauschenburg and the architecture of Bruce Goff and Frank Gehry.

The second component of the project represented the translation of the two-dimensional graphic interpretations into three-dimensional form. Like Schwitters' "merz" constructions, the students' collaged spatial ideas, at least in two dimensions, seemed to imply dynamic interpenetrations of planar forms with spatial implications. From their studies involving the application of tonal values, the students had already begun to articulate spatial relationships through the implied advancing and receding planes which resulted. The translation from graphic composition to sculptural form was not that difficult.
Each student was required to select one of his or her graphic compositions and interpret it in three-dimensions. Initially, the students worked on crudely fabricated study models in reference to the selected composition. The design process began as a literal interpretation of the graphic composition. However, as they worked new possibilities and unforeseen complexities emerged. First, the scale of the model was twice the scale of the drawing. The increase in scale made it easier to fabricate the model and also helped to clarify spatial ambiguities implied in the graphic two-dimensional composition. After a certain degree of trial and error, a maximum height of 2 1/2" and a minimum base depth of 1/4" was imposed. Limiting the maximum height seemed important because the emphasis of the model was on the compositional and sculptural properties of form, not volume. Furthermore, there was an explicit desire to limit elevational considerations concentrating instead on the expression of pure geometrics. Even with such proscriptions, students were able to spatially articulate the interpenetration of planes and forms in imaginative and innovative ways.

The requisite monochromatic color of the models imbued them with a uniform neutrality placing emphasis upon the formal resolution of the sculptural composition. The tonal values of the graphic compositions were directly reinterpreted in the three-dimensional constructs. Furthermore, the models, like the graphics, became instantly recognizable for their sculptural, abstract aspirations and were less likely to be regarded from a metaphorical point of view. In the final analysis, the models became the three-dimensional interpretations and transformations of the graphic compositions. Within the context of the two- and three-dimensional investigations of the unification of figure and field, students were able to discover compositions derived from the interactions and regulating lines as spatial organizers within a given field. Through tonal variations, spatial depth could be suggested and compositional balances of tonal values and planes could be articulated. The application of tonal values further unified figure/field relationships, defined geometries, and suggested spatial qualities through the perception of advancing and receding planes of opposing tonal values. Ultimately, the model served as the definitive link between graphic analysis and ideation to three-dimensional realization as the sculptural embodiment of planar hierarchies and compositional order.

This is not to assert that the design process is linear and that its natural progression is or should be from drawing, to model, to built form. In subsequent projects, students have investigated the design process in other ways--even reversing the order beginning with the model and terminating with graphic representations of design intentions. The value of the project as a pedagogical device lies in the fact that it can be directly related to architectural and artistic precedents, from the Greeks to the modernists, which sought to unify heterogeneous architectural forms through the simultaneous perception of figure and
field and that it reaffirms and demonstrates fundamental principles of spatial order through the dynamic manipulation of proportionately related geometries.

NOTES


2. One of the basic facts of the Greek environment is the individual character of places. Places were manifestations of archetypal characters. Greek sanctuaries are determined by the character of the place, the "topos," and do not admit any geometrical grouping of buildings which would symbolize a more abstract, general order. Buildings are individual units representing archetypal human characters which participate in the situation symbolized by the site.

The Greek concept of space is pluralistic. For the Greeks space was not "one" thing, but "many." According to Norberg-Schulz, this pluralism liberated man from the constraints of an all-comprehensive system, and allowed him to transcend the world of casual improvisation. The harmonious interaction of different modes of spatial organization in Classical Greek architecture was the product of an historical development involving the transformation of organizational orders. From their common point of departure, the megaron, the temple and the dwelling moved in opposite directions. The temple became ever more a manifestation of a well-defined character, whereas the house developed toward functional differentiation.

The choice of different spatial organizations according to each individual situation was never casual; it happened within the limits of an integrated language of building types and means of articulation ("orders"). The individual phenomena of daily life were seen as manifestations of interacting archetypes or "ideas" in Classical Greek thought. Plato represented these ideas as absolute, and argued that man ought to consider them the ideal of perfection. In Greek "cosmos" means beauty as well as order. Platonism seeks the key to natural phenomena in perfect final causes.


3. "Cubist simultaneity point of view" is a phrase so familiar, and in one sense so well founded, that it seems to cover whatever else in that line there was to invent . . . . Cubism had not done it all. Its simultaneities--imagine a bottle in elevation poised against the plan of a tabletop--are of a special order. Their
function is always disjunctive. Their purpose is not the integration of forms but, on the contrary, the fragmentation of solid structures for insertion in a relief-like space where no hint of reverse aspects survives.

Within the Cubist style, the ideas of corporeal integrity and aspect-simultaneity are antagonistic; designedly incompatible. The faceted objects that appear in the first Cubist phase (late 1908 to 1910) retain a good deal of density, but they suggest little interest in simultaneous point of view. And by the time that interest develops in Cubism's later phases, objects are drained of mass and the picture is flat.

Steinberg, Leo "The Algerian Women and Picasso at Large" (from Other Criteria: Confrontations with Twentieth-Century Art, Oxford University Press, New York, 1972, pp. 154-155).


5. Ibid., p. 29.

6. In 1907 Reviere and Schnerb wrote about the nature of the gestalt of Cezanne's painting. Focus proceeds part by part, in fragments, our memory unites diverse elements. The motif is distinct from subject, it is "a portion of nature encompassed by one's view of it and for that very reason, is explained in perceptual terms. In doing so, Riviere and Schnerb lead the way to the Cubist understanding of painting.

Ibid., p. 27.

7. The effect of Cubism on the imaging of familiar bodies was to unsolder their structure and scatter their parts. Cubism was still a transformation of remembered solids into a two-dimensional system . . . . Whereas two World Wars later, the flat Cubist space is taken for granted . . . . Simultaneity of aspects aiming at consolidation becomes a new structural mode.

Steinberg, Leo "The Algerian Women and Picasso at Large" (from Other Criteria), pp. 154-155.


9. Since Vitruvius architects have been trying to develop metrical relations which would give an ideal order and structure to architectural form including the facade, floor plans, and elements such as doors, windows, stairs, and columns. This was thought to be the way of achieving absolute beauty. Especially in the Renaissance, such attempts were referred to systems of numbers and rules of proportion.
In Elements of Architecture, Rob Krier contends that the aim of achieving a harmonious beauty cannot be reached only in this way. If one considers the oblique view given at the base of a building, together with the constantly changing contrasts and effects of depth caused by light and shade, prevent us from perceiving such truly calculated proportions exactly. Nevertheless, it seems important to examine window proportions with the golden section, and equally to study the proportions of opening and parapet, base and total height, etc. In time a "natural" sense of pleasant, harmonious proportions will emerge, e.g., a well-balanced composition.

10. Steinberg "Jasper Johns: The First Seven Years of his Art" (from Other Criteria), pp. 51-52.


FIGURE/FIELD PERMUTATION: DRAWINGS
FIGURE/FIELD PERMUTATION: DRAWINGS
FIGURE/FIELD PERMUTATION: DRAWINGS
FIGURE/FIELD PERMUTATION: MODELS
5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT
University of New Mexico/School of Architecture and Planning 2414 Central Avenue S.E., Albuquerque, New Mexico 87106 505/277-2903

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5th Conference, Albuquerque
These studios and lecture classes deal less with accommodation (or synthesizing and form giving) and more with assimilation (observing and analyzing). They are concerned with discovering and learning from our social, environmental and historical context as a predicate to design.

Thallon and Young find lay persons responsive to the descriptive patterns in Christopher Alexander's "A Pattern Language", and use this as a starting point and model for their studio projects. Eidson, similarly, has her students document and analyze existing environments in sketches and graphics that require them to organize and conceptualize observations. Bartuska and Young have developed a pre-studio survey course that exposes students to the dynamic and creative forces that shape the built environment. Shinberg and Walton assume students come to class with a wide range of pertinent experience, and use the immediate environment as a resource for students to hone their perceptions and to learn about the diversity of architecture and the profession. Harlow also uses the existing environment as the starting point. His students analyze works of famous architects, discovering physical and social issues, exploring 2-D and 3-D interpretations and learning ideas, concepts and historical perspectives. Then, they present the analysis and its underlying concepts in the graphic style of the architect.
Pattern Language as a Tool for Teaching Beginning Students

by

Rob Thallon and Jenny Young
University of Oregon

As professional designers, we have both used pattern languages, based on the work of the Center for Environmental Structure led by Christopher Alexander, in working with our clients. We have both observed that our clients have had their image of the potential for their project significantly enhanced when introduced to A Pattern Language. After reading the appropriate patterns, clients gain a basic understanding of the architectural principles to be developed on their projects. The chosen set of patterns helps them to see their project as a whole in which a large set of discrete issues must be addressed. They also find in individual patterns evocative descriptions of time honored architectural principles which help them to sense the real possibilities for their project. The patterns are the starting place for discussions in developing design concepts and in evaluating them once designed.

Based on our positive experience with clients, we assumed that beginning students would respond similarly and that, therefore, patterns would be appropriate for teaching architectural principles in beginning design studios. Last year we tested this theory by organizing our first year studios around a series of short-term projects of increasing complexity using patterns as the primary vehicles for
teaching architectural principles. This pedagogical approach has four underlying assumptions:

1.) **Architectural knowledge exists.** Architectural principles can and should be explained and communicated. This belief is in contrast to the subjectively based “feels right” and “I like it” approach to design which many entry level students expect to be sufficient. Sources of architectural knowledge are far ranging—from historical examples, research in environmental psychology, logic, anthropology, and descriptions in literature and art. Each pattern is an explicit statement of an architectural principle developed from these sources and includes an argument to support it. The set of patterns becomes a vocabulary in the design of a project. This gives the student and the teacher a common point of reference of discrete architectural principles to discuss and evaluate the designs. Students learn not only the principles involved but also the idea that their task as students and later as professionals is to constantly evaluate the built environment.

2.) **Architecture is based on values.** The difference between architecture and simple building and between good architecture and bad architecture has to do with the character of the questions asked. The values underlying the theory of pattern languages are those of an architecture in which the experiential quality of a town, a garden, a building or a room is of primary importance. What does the place feel like? What makes it a beautiful place to be? How is it timeless and yet rooted in its specific connections to persons and place? These are the essential questions addressed in the evocative patterns and we believe they are the most important questions for students to be asking. Educating students to the values of the beauty and experiential quality of a place is a most essential reason for using pattern languages.

3.) **There is value in the experience of students prior to entering architecture school.** The patterns are effective with lay people because they directly describe the issues of the environment that relate to their everyday experience. Consequently, they can easily understand the architectural principles and respond to them. For the students this is the same. This is very different from an abstract design approach in which the terms and discussion are divorced from everyday experience, are abstract, and tend to be difficult to understand. Although there are inherent dangers with this approach because most of our students and indeed most client’s experience base is in suburban America
with tract housing, strip development, and shopping malls, the patterns can start to bridge the gap between their limited experience and the rich potential of architectural design.

4.) In designing there is a logical heirarchical structuring of issues from the larger more global scale to the smaller and more particular scale. The art of designing involves developing a sense of the whole which gets developed in parts which are supportive of that whole. Pattern language clusters groups of patterns relating to similar scales of decisions in a heirarchical order. With our beginning students, as they began to work on more complex projects, we clustered sets of patterns from larger to smaller scale.

Our underlying strategy for the term was to start with a series of small projects of increasing complexity which would build understanding and confidence in a additive way. These smaller projects would culminate in a larger more comprehensive project at the end of the term. We felt it important to have the final project be a small but complete building. The vehicles we chose were a sitting place, a gateway, a courtyard and, for the final project, a gatehouse/information center for an open-air agricultural museum.

The sitting place project was presented to the students with just one pattern, (241) SEAT SPOTS, as one piece of architectural knowledge. Students were asked in teams of two to measure and draw several places to sit on and around the campus. They were then asked to analyze these various places with respect to the pattern. The principles of the pattern are clear, and the students were able to make useful and sensitive analyses of the existing sitting places.
makes the principles visual, it simplifies them, and it starts to give students confidence in their own drawing ability. We feel that the diagram is a critical connection between generic architectural principles and the context of specific projects because in designing one forms a specific site/program related response to generic issues and demonstrates these in diagrams.

For the next project of greater complexity - a courtyard with sitting spots and a gateway - the patterns were used as diagnostic tools to evaluate existing examples. Unlike clients, beginning students are not necessarily familiar with the architectural space being designed. A shopkeeper, for example, comes to an architect as a client with a keen eye for the subtleties of retailing and a vested interest in designing a space to support his/her business. A student seldom has experience equal to a client and never has the same vested interest. Consequently, in the case of the courtyard project, we sent our students out to study local courtyards. They were armed with 15 patterns which deal specifically with courtyards and their components. We also had them each examine a published example of a courtyard which they liked. In addition to documenting and analyzing local courtyards, then, the students were exposed to a number of design principles relating to courtyards. Using these principles combined with their own experience and published examples, they could begin to evaluate courtyards and to formulate and recall images of effective courtyard places.
Where outdoor seats are set down without regard for view and climate, they will almost certainly be useless.

We made random spot checks on selected benches in Berkeley, California, and recorded these facts about each bench: Was it occupied or empty? Did it give a view of current activity or not? Was it in the sun or not? What was the current wind velocity?

Three of the eleven benches were occupied; eight were empty.

At the moment of observation, all three occupied benches looked onto activity, were in the sun, and had a wind velocity of less than 1.5 feet per second. At the moment of observation, none of the eight empty benches had all three of these characteristics. Three of them had shelter and activity but no sun; three of them had activity but no sun, and wind greater than 1 feet per second; two of them had sun and shelter but no activity.

A second series of observations compared the number of old people sitting in Union Square at 3:00 P.M. on a sunny day with the number at 3:00 P.M. on a cloudy day; 65 people on the sunny day and 21 on the cloudy day, even though the air temperature was the same on both days.

It's obvious, of course—but the point is this—when you are going to mark in spots in your project for the location of outdoor seats, sitting walls, stair seats, garden seats, look for places with these characteristics:

1. Benches facing directly onto pedestrian activity.
2. Benches open to the south for sun exposure during winter months.
3. A wall on those sides where the winter wind comes down.
4. In hot climates—cover to give sun protection during the midafternoon hours of summer months, and the bench open to the direction of the summer breeze.

Therefore:

Choosing good spots for outdoor seats is far more important than building fancy benches. Indeed, if the spot is right, the most simple kind of seat is perfect.

In cool climates, choose them to face the sun, and to be protected from the wind; in hot climates, put them in shade and open to summer breezes. In both cases, place them to face activities.

The summary of this and every pattern is in the form of a diagram, and we asked the students to express their analyses of the sitting places with diagrams. This diagramming is an essential part of using the patterns as it
The patterns were also used in a generative sense in a very similar way to which we use them with clients. First, we selected a subset of patterns relating to a particular design issue. The gateway project, a component of the larger courtyard project, for example, had a sub-set of 9 patterns. The first pattern in the set (53) MAIN GATEWAY deals with the largest scale issues and the last (244) CANVAS ROOFS with the most particular. Each student was assigned a pattern and was required to report to the class on the principles of the pattern, to give an illustrated example of the principles in use, and to suggest with diagrams how those principles might apply to the particular situation. These patterns were discussed one by one, and in order.

The issues were dealt with separately so that the ideal relationship could be studied for each principle independent of the influence of other principles. The principles usually reinforce each other but occasionally, because of the context, they are in conflict. We teach that both situations are common and we do not attempt to reconcile conflicts before all of the patterns have been considered. This attitude reinforces the idea that design is an act of balancing and that there is no "correct" solution.

By discussing the patterns in order we were dealing with the issues in order of their scale and (usually) their importance. This is an important lesson for beginning students who often tend to focus on small scale issues before resolving the larger scale ones.
This general format was used for all of the smaller scale warm-up projects and, to a certain extent, on the major gatehouse/information center project. The gatehouse project differed from the others primarily in its degree of complexity. Instead of 15 patterns, the sub-set for the gatehouse contained about 50 patterns. This complexity was not intimidating because an understanding of many of the issues had been gained by the work on the earlier projects. The complexity was further minimized by grouping the patterns into clusters roughly corresponding to the activities of site design, schematic design, and design development.

We should point out that although patterns are very effective in describing the relationships between human activity and experience and space, they are less comprehensive in dealing with principles of spatial composition and with technical issues. Working with clients, we as architects provide this knowledge and incorporate it in the design. For our students, we incorporated investigations into spatial order, historical precedents, and structural and environmental concerns into the project. For example, in dealing with the structure for their projects, students read the pattern "Structure Follows Social Space" but also read from Edward Allen’s *How Buildings Work* and developed 1/4" structural models to apply this array of principles. Through the use of patterns and these additional principles, we feel that the students were able to integrate a large number of complex issues in a relatively short time into sensitive and
developed schemes.

In conclusion, we feel that the patterns helped students in the same way they help clients to quickly and directly begin to understand basic design principles that can make inspirational architectural space at a human scale. They also provide a basis for discussion of these principles in evaluating designs. We feel that the use of patterns also helps students understand the qualities of architectural space experientially. This perspective helps the students avoid becoming too abstract in their designs and helps them to realize the (larger) qualities which architecture must achieve. The clustered hierarchical structure of the patterns helps students in the same way as it helps clients to realize that the part must develop from and contribute to the whole. The set of patterns to which students had been exposed by the end of the term, like the set typically read by clients, contains a large and rich set of issues. The students will hopefully carry the understandings gleaned from these patterns as a basis on which to build in their future design studios.

Certain criticisms about using patterns need also to be looked at. One criticism is that designs generated by patterns are too piecemeal; the evocative power of each pattern overpowers the hierarchical structure, and consequently a pattern like "built-in seats" starts to appear everywhere with no relationship to the whole. Another criticism is that the designs are too medieval, since many
patterns are illustrated with images from preindustrial worlds. A third criticism is that the designs are too much like glorified tract houses with built-in seats, because the patterns are best used at houselike scales and because their use is too superficial, so the more powerful tract house imagery ingrained in students overpowers them. These potential pitfalls are real, but we feel from the quality of the student work that they have not stumbled too deeply into them. Over time, as students develop their ability to synthesize and interpret principles into contemporary building materials and methods of construction, the quality of their designs will improve, while the experiential base and the understanding of the scales of design decisions will be a firm foundation for this development.

In terms of the process, the greatest criticism of using patterns is that they limit creativity. From our professional experience we feel that the patterns liberate creativity by setting a framework of good architectural ideals and a wholistic approach within which to be creative. Our experience with students is only slightly different. Many students come to the program believing that creativity is doing whatever they want to do. Learning that there is such a thing as architectural knowledge and that this knowledge really enables one to work creatively is an essential lesson for first year students. Within our studios we have found some wonderful creative development, although it may indeed be several years before students really understand how a framework of principles liberates rather than restrains.
INTERIOR FIELD STUDIES: TEACHING BEGINNING STUDENTS INTERIOR ARCHITECTURE

Teaching beginning architects and interior designers the organization of interior spaces has been done using rule systems and planning patterns of existing typologies. Recent texts have provided students with schematic images of architectural forms that can be translated into their design projects (White, 1975; Alexander 1977; Ching, 1987).

Experiential interiors are, however, more than patterns and groups of spaces, forms, and objects. While texts of these "organizational maps" present typologies and diagrammatic ideas about how to design, beginners seeking to create unique and creative designs need personal experience and perceptual understanding of the buildings they seek to design if they are to do creative work.

To provide beginning designers with the skills to make decisions and to conjecture from experience, a technique using Interior Field Studies has been developed. Studies of perceptual, intellectual, and dynamic qualities of interior environments are sketched and described as beginners expand their knowledge, understanding and experience.

This paper will discuss the pedagogy of Interior Field Studies that nurture conceptual thinking for the creative design of architectural interiors. Slides will illustrate this methodology for teaching beginning students in the Design Studio.

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Teaching beginning architects and interior designers to design and organize architectural interiors requires design experiences that puts learning in the hands of students. When beginning designers leave foundation studies that have focused on abstract spatial systems and rule directed design projects to begin their design studio sequence, they often pointedly remark that they "hit the wall" as they attempt to apply the elements of architecture to the design of functional places for people. Reality is a whole new beginning.

Interior field studies provide beginning designers a guide through the labyrinth of interior design issues that include providing functional spaces for specific tasks, providing containers for activities that are social and cultural, and providing spaces that are mnemonic and experiential. Before explaining the methodology of field studies it is important to clarify the place of interior design in the architectural totality and its task in the interpretation of architecture.

Architecture is a totality, a composite by definition composed of the building, housing the proximate environment of interiors, extended by landscape, in a neighborhood, a segment of the cityscape, and a place in the world. All buildings have interiors, though they may change over the years and completely alter the meaning of the building shell. The building shell thus may become an architectural artifact, an envelope for a myriad of uses.

Interior design is the conceptual interpretation of an existing architectural artifact or one that is designed by someone else. Interiors are expected to be environmental filters, containers for activities of all kinds, and by their disposition of elements—walls, stairs, light, equipment and furnishings—to modify behavior and activities; by providing spatial fit, and by providing for the social and cultural needs of occupants. Interiors are mnemonic for they communicate through metaphor and symbolic elements the values of their owner and designer.

In the beginning design studio how does one teach this complex interior design specialty? The first step obviously would be to provide learning experiences in a variety of building types: Offices, Retail Spaces, Restaurants, Public Spaces, etc. A number of excellent books are available for teaching the interior development of building types, spatial
systems, and spatial organization. Each present numerous "organizational maps" that provide students with spatial systems and adjacencies that students can use in their design projects.

What I mean by "organizational maps" are the schematic arrangements of functional spaces and circulation paths found in books of elements and principles, such as Edward T. White's Concept Sourcebook (1973), Paul Laseau's Graphic Problem Solving (1975), F. Ching's Architecture: Form, Space & Order (1979), and R. Clark & M. Pause's Precedents in Architecture (1985), to mention a few. Each of these texts provide students with functional groupings and zoning diagrams in schematic or sketch form that illustrate the organization of building types and the relatedness of environmental building units. Building standards and organizational rule systems have also been used to teach beginning students the elements of architectural interiors.

With these various methods, the beginning designer learns to recognize objective facts and features relevant to architectural composition and to acquire formulas for making decisions and achieving design solutions. Everything relevant to a project is so clearly and objectively defined that the appropriate response can be identified without reference to the contextual issues of the architectural totality.

The problem with these diagrams, organizational maps, standards and rules is that they may provide ideas for problem-solving, but they do not provide the necessary inspiration for concept development nor for designing experiential interiors. The ability to organize space for functional, cultural, and social uses is abstracted from conscious and unconscious memory. Experience provides the tool kit for making and shaping spaces for people. To design and organize the interior of a train station presumes an understanding of what a train station is as well as some experience of buying a ticket, waiting for the train to arrive, traveling on it to a destination, and debarking into another similar, but reversed, sequence. The same holds true in the organization of hospitals, offices, department stores, etc., etc.

The missing ingredient for providing beginning designers with the skills to make judgments and to conjecture about the feelings and emotions that should be generated in the perceiver moving through a building was personal experience. The place for learning that experience was in looking, sketching, and in the field studying people using interiors.

The first experiment in "field studies" as a method for teaching beginning students was in the design of a Department Store for a Shopping Mall. The purpose was for design students to experience Department Store spaces through direct involvement
Interior Field Studies
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instead of second-hand through descriptions by others or from memory. Students were asked to look for and to sketch the Shape, the Context, and the Dynamics of assigned places in preparation for their design work. In order to better understand the totality of a department store, they were required to read about Department Store design in Time-Saver Standards for Building Types (1980) before they began their field studies.

Students were instructed to make sketches only on white sketch paper (12" x 18") with all sheets the same size. Each sheet was to be titled and dated with sheets numbered for an informal grouping to be presented in the studio. All drawings were to be done in black and white with the additional use of two gray markers (#1 and #5, warm or cool gray) for adding depth and interest. No color was to be used in these field study sketches. Appropriate notes were to be added as necessary to communicate the assigned observations.

Two Department Stores in local shopping malls were assigned for study and two Department Stores featured in current architectural or interior design periodicals were to be evaluated as completely as the magazine illustrations permitted. The assignment read as follows:

In a nearby shopping Mall, spend approximately one hour in each of the following spaces sketching and noting the required observations:

(1) The entrance area to the major Department Store of the Mall. (If there are more than 1, select one that parallels your own design work.)

(2) A sales space in a Department Store interior which has a service register area for sales clerks, but pick a space that has 3 walls. Sketch several such spaces for comparison--your choice.

(3) An office area (credit department, staff offices, etc.) for a confined or private space. (See if you can visit a storeroom.)

Make three sets of observations in each of these assigned spaces:

1. The SHAPE of the space: Draw a thumbnail sketch plan and then a perspective sketch of larger size to which you add one or more figures to establish relative size. Consider that you are physically within this space you perceive. What you are drawing will surround your own spatial concept.
2. **The CONTEXT of the space:** Make written notes and/or sketches which describe the range of materials which define the interior area. Describe the characteristic sounds which the size, shape, and surfaces tend to reverberate. Describe the smells you perceive, the thermal qualities of the space, and any other sensory qualities which you observe.

3. **The DYNAMICS of the space:** Draw a second larger plan and on it make diagrammatic notes of how people arrange themselves in relation to each other and to the periphery of the space. Are people manipulated by furnishings or fixtures? Note the patterns of stationary and moving elements made by the inhabitants of the space.

Next select two recently designed department stores in current periodicals (Progressive Architecture, Interiors, Interior Design, or another professional journal) and follow the same process as far as you can. If you can find no mall department stores in your periodical review, use any department store or large shop. The idea is to study current design trends and observe how others are solving similar design problems. Note on your sketches the name of the periodical, the date, and the page numbers of the project.

The assignment was given midweek with sketches due at the beginning of the next week. The results were impressive. Students pinned up lively and spirited sketches that illustrated the objects and contents that made up the department store with the functional interior elements along a continuum of various axes. Studies provided sketches and diagrams of horizontal and vertical distribution of forms, spaces and how people interacted within those spaces. Through experience and observation, students came to a intellectual and perceptual understanding of the complexities of the assigned spatial envelopes. The drawings produced provided visual notes for the design project.

Because these studies were self-directed, students found the assignments intrinsically rewarding. Their sketches were creative and designful with many cartoon-like drawings that instantly communicated ideas and intentions. Even students who were not very skilled at drawing expressed delight with the field study exercise. Because these were drawings for information and analysis, none of the beginning students felt any fear of failure and thus sketched perspectives, plans and details with courage and confidence.

In the past four years as field studies have been used in a variety of complex projects, the value and validity of the teaching technique has been steadily confirmed. Students have
Interior Field Studies
P. L. Eidson, Associate Professor
University of Massachusetts

explored restaurants, deli's, shops, banks, and library spaces, to name some of the building types. In each case, students sketched and examined the SHAPE of space, the spatial CONTEXT, and the DYNAMICS of space. No two students pinned up the same kinds of studies, even when they went sketching in groups. All attested to the fact that they felt "creative" as they pursued their individual field studies.

It is important that in teaching beginning studios, instructors recognize that creativity and change are risky. Unless beginners are motivated to consider and test new possibilities and new ways of thinking about design, students will select known solutions to design problems, designing what is safe. By definition we call a new design idea "creative", and we recognize in that new idea a change from what has existed, for good or bad. It takes courage and confidence to pursue new directions and new concepts for one can be successful or fail in their effort to be creative. Teaching beginners challenges the professor's skills, for the purpose of design studio is to provide beginning students experiences for learning how to think creatively and do creative design work.

There are three basic ingredients to creative design work, and Field Studies address all three:

First, basic cognitive skills, work style, concentration and persistence as well as thinking strategies conducive to generating ideas.

Second, intrinsic task motivation which provides the beginning designer with delight in doing design for its own sake, excitement in discovery, not just for reward (grades, a prize, etc.) but for personal satisfaction.

Third, expertise in the field of study (architecture or interior design) that includes drawing skills, understanding the manipulation of basic architectural elements (line, dot, plane and space), concentration and persistence that is conducive to generating ideas and concepts, and a work style that enables one to meet deadlines.

To be a creative designer is not merely to be eccentric or unusual. What we call creative design is rarely accidental or rule based but built on a firm foundation of experience and involvement in complex interrelationships of forms, space and people in life situations. Using field studies to teach beginning design reinforces practical knowledge about building types while the application of visual notes reinforces cognition and intuitive understandings and assumptions. Field Studies, by their focus on learning, not teaching, nurture conceptual thinking for the design of architectural interiors.
ILLUSTRATIONS OF FIELD STUDIES - FROM STUDENT ASSIGNMENTS FOR INTERIOR DESIGN IN ARCHITECTURE

Department Store Field Studies:
  G. Fox & Company
  Steiger's

Restaurant Field Studies:
  The Iron Horse
  Interiors Magazine Study

Shops Field Studies:
  Claire's Boutiques
  The Foot Locker
  The Body Shop

Shops Symbolic & Design Feature Studies:
  Bart's Ice Cream
  Always In Bloom
HIGH-TECH / NEW AGE
GEARED TO FASHION
CONSCIOUS YUPPIE.

MOST PEOPLE
ENTER
THROUGH THE
SPACE.
SHOPPING AT
THE DISPLAY
ENTRANCE
IS A DISPLAY,
NOT A LOW
WALL (SEE
STELENESS /
FOX WOMEN'S
DEPT)
PERHAPS MEN
NEED COACHING
TO GO IN, WHY
WOMEN INHIBIT
BUY JEWELRY
ON THEIR WAY
OUT AFTER
BUYING CLOTHES.

CHROME CLAWS.
JEWELRY COUNTERS
WOODEN FLOOR
CARPET
CHROME AL-CAN CEILING
LANDS CREATE LACY SHADOWS ON CLO.
MIRRORED CLHNS, MAJOR PATH
LIT UPLIGHTS

MORE CONSERV.
SOFT ROCK ON THIS
SIDE

G. FOX & CO.

MTV SERENADES
SHOPPERS BROWS
THROUGH
DESIGNER CLOTHES
NEON AS SIGNAGE
CONFUSING
DISPLAY

MAJOR PATH

VISUAL NOISE
HIGH TECH
SOPHISTICATED
ADVERTISING TECHNIQUES
GEARED TOWARDS
YOUNGER CROWD
DOESN'T APPEAR AS
A TRADITIONAL FAMILY
STORE.
TWO DIFFERENT TYPES OF CARPETED ZONE AREAS

ENTRY POINT MOST USED

WARM FLUORESCENT LIGHTING WITH DIFFUSERS FOR SPOTS DIRECTED AT CLOTHES.

CHROME

ACOUSTIC TILES

VIVIDLY COLORED GEOMETRIC SHADES

SPACE IS IN KEEPING WITH FACADE OF STORE (MODERN, PROGRESSIVE, FUTURISTIC, SOPHISTICATED)
MORE SUBDUED THAN G.FOX. CATERS TO
ESTABLISHED FAMILY TYPES. QUALITY EXEMPLIFIED.
STEIGERS CREATES AN AMBIANCE OF STABILITY.

MOSAIC PUMPED IN.

SOOTHING HOMEY APPEARANCE WITH WARM WOOD
TONES / PINK. LOW CEILING WITH DIRECTED SPOTS.

CARPET
PARQUET FLOORS
MIRRORED COLUMNS
SLATTED WOOD

CLASSICAL MUSIC / RUSHING WATER INVADES ENTRY SPACE FROM ATRIUM.

NO ONE STANDS HERE
WOMEN INPULSE BUY / STOP AT SEVERAL PTS. WHILE DEPARTING.

Steger's
The Iron Horse has the atmosphere of an old New Orleans Jazz Café. At night with a musician on the stage, it is lively yet not loud, and frequented by the same crowd of people. During the day it has a relaxed quiet mood about it. The style and setup of the oak furniture is casual. The walls are decorated with all types of old and new musical instruments. This gives it the feel of one of the famous local places where artists meet and launch their famous careers. Casual yet classy.

The material used is mainly wood. There are no loud colors or man-made materials. The floors, tables, chairs, booths, counters, stairway and some of the main structural elements in the restaurant are all wooden. The walls are painted light cream.

Due to the wood and the 16-18 ft ceiling height, the acoustics are very good for the musicians, yet it swallows all lower talking sounds. This means that the restaurant is never too noisy.

The entire restaurant is lit with incandescent lamps. The first floor of the restaurant is installed with suspended low wattage (brightness) ceiling lamps, which drop about 7-9 ft from the ceiling. The second floor is lit with wall fixed lamps. During musical performances these lights are dimmed.

The Iron Horse
The Iron Horse

Floor Plan & Dynamics

These studies were made on a very busy night when there was a musical band playing. It should also be assumed that all the seats in the restaurant are close to being taken (i.e. 90% are occupied.)

The first floor of the restaurant seats 45-550 people. (There are 5 booths.) The second floor will seat 25 people.

These studies do not distinguish personnel from customer. It should be noted that since there is no seating at bar or counter and all check bills are paid through waitpersons, there is no need for customers to be at bar/counter area. (Hence they are seldom in that area.)
THE IRON HORSE

UPSTAIRS SEATING

STORAGE

KITCHEN

BAR

SERVICE COUNTER

NO SEATING HERE (BAR)

RECEPTION

STAGE

 RESTAURANT

SEATING (CHAIRS)

WALL

WAIT STATION

BATHROOMS, MUSICIAN & WAITRESS LOUNGE ARE LOCATED DOWNSTAIRS TO SEATING UPSTAIRS

CUSTOMER WAITPERSONS

SECOND FLOOR

CIRCULATION & FUNCTIONAL RELATIONSHIPS
Probably a little noisy but...

- Good under counter store, for customers
- Good food quality
- Good use of materials for cafe-like atmosphere (wood, tile, marble, glass)
- Food openly displayed
- Circulation seems tight in table area
- Kitchen is part of atmosphere of cafe visible to customers

INTERIORS
August, 1981
PP 66, 67
Cigan Padgham
4-22-86
- JEWELRY STORE, COSTUME.
  ALSO SELLS ACCESSORIES.
  (HANDBAGS, BELTS, HAIR CLIPS, ETC.)
- EASY MOVEMENT THRU THE
  STORE, A LITTLE CRAMPED.
- COLORFUL MERCHANDISE REFLECTS
  OFF THE HORIZONTAL ALUMINUM
  TAMBOURS.
- SMALL MALL SHOP
- VERY CROWDED, HARD TO MOVE AROUND, A LOT OF COLLISIONS DURING PEAK HOURS.
- SELLS SPORTSWEAR & ATHLETIC SHOES.
- DIAGONAL OAK SIDING ON INTERIOR & ENTRANCE
- USE OF TRACK LIGHTING & PENDANT LIGHTS.

FOOT LOCKER
BURLINGTON MALL
BURLINGTON, MA.

BEV BIER
NOTES
1. Very lively/energetic
2. Machines are always in use
3. Music is very pro energy/upbeat/PM
4. Atmosphere very electric
5. Colors are very pleasing, soft, colorful
6. Lighting is alright/could be improved
7. Ventilation is bad/could be improved/located at the basement
8. Machines are organized in sequence
9. Always someone at the desk/counter
10. Maintenance is pretty easy
11. Vacuum done every 2nd/3rd day but suggested vacuum everyday
12. Blue Carpeting/colorful walls/squares
13. Equipment by Hydrghton
THE BUILT ENVIRONMENT
An Integrative Course for Beginning Design & General University Students
THE BUILT ENVIRONMENT: AN INTEGRATIVE COURSE
FOR BEGINNING DESIGN AND GENERAL UNIVERSITY STUDENTS

By

Tom J. Bartuska and Gerald L. Young
Washington State University

The "built environment" is a relatively new term and concept. The substance of the built world is as evasive as it is pervasive. The topic, aided by cohesive definitions and clear conceptual organization, is challenging and rewarding to explore and study. This is especially true for beginning design students as well as the general public. The built environment can be conceived as a fascinating, interwoven tapestry of all the artifacts of human creativity and/or folly. We examine built artifacts of the past to understand the accomplishments of historic settlements. Similarly, future societies will measure our culture by what we collectively build for future generations. The products humans create, the interiors and structures they build, the landscapes and cities they shape, even the regions and earth redefined by human intervention are collectively the interrelated components of the built environment. This human created environment permeates all corners of the world, enriches and/or limits all human activities and is expressed in all the places humans live, work and play.

In the late twentieth century, designers and the public share the need to understand the complex and dynamic interplay between people, their creative activities, and the resultant built environment. Two educational goals can be identified to address this shared need. The first goal is to establish a common forum to address these issues comprehensively. This educational program is rewarding, can unify the design disciplines, and creates an interdisciplinary foundation for future career choices and life-long learning. The multiple disciplines involved in environmental design are too often institutionalized into separate programs and need to foster a more cohesive and collaborative understanding of the importance of their role in society. The second educational goal focuses on fostering public awareness, understanding and participation. The "public" realm is far less pronounced and often forgotten, yet it is fundamentally important because the public comprises the designers' clients as well as the users who in turn continue to shape the built environment.

A Built Environment Course: Educational Goals, Content and Strategies

An experimental interdisciplinary course on the built environment was initiated at Washington State University in the early 1970s to address the needs and achieve the goals introduced above. It was offered in 1974 as a special topics course in Environmental Science. Environmental Science is a unique all-university program created to study environmental issues in a holistic and interdisciplinary way. The intent was to explore the various aspects of the built environment. This experiment met with considerable enthusiasm from a diverse group of students and faculty. This effort evolved into the development of a permanent team-taught course in Architecture, Interior Design, Landscape Architecture and Environmental Science. It has
evolved from a class of 18 to a course for design and "general" students with an enrollment over 300.

Currently, the Built Environment course is placed in the beginning segment of all the design curriculums on campus. Most design students in Architecture, Interior Design and Landscape Architecture take it together during their first or second year. It establishes an integrated understanding of all the design fields, fosters collaboration and effective career choices. Since most of the students in the class are just beginning to take design studios, they are exposed early to an inclusive overview and to an interdisciplinary, integrative synthesis of how their design work may fit into the structure of the built environment.

The Built Environment course also satisfies a Humanities requirement at Washington State University. All WSU students are required to enroll in a minimum number of humanity credits in order to graduate with a bachelor’s degree. This course, emphasizing the art, crafts, and design traditions of world civilization, fits admirably within the boundaries of the humanities. The result is a large group of students enrolled each spring semester with a dynamic and creative mixture of beginning design students as well as students from every corner of the campus.

Educational Goals

The Built Environment course at WSU was developed to address and clarify the many complex and interrelated aspects of the human-created environment. It is a response to the recognition that design (and other environmental) issues overlap many fields of study. The course is dedicated to the elimination of apathy and, conversely, to the encouragement of students to become aware of and involved in the many challenging aspects of the built environment. The specific educational goals include:

1. As an integrative course for beginning design students from all the design disciplines, it fosters an inclusive understanding of the built environment, clarifies the collaborative role of all the design disciplines, and encourages more effective career choices;

2. As an interdisciplinary, team-taught program, it unifies the design faculty which are unfortunately located in three separate colleges in four locations throughout campus; and

3. As a General University course in Humanities, it promotes public awareness of and involvement in the important life-supporting qualities of the built environment.

Increased understanding of the built environment should lead to people influencing that environment in a positive, contributing way. Quality tends to encourage more quality, more personal enjoyment, enrichment and then more involvement. Poor quality manifests apathy and has a negative impact upon human health and well being.

The course encourages active participation and attempts to increase student interest, sensitivity and ability to analyze various aspects of the world around them, the world they themselves have created—or can or will create. The aim is to provide an initial working knowledge of the spirit of
creativity apparent in the built environment and of the complexity that results.

The course has a unified, but flexible, conceptual framework which is easily transferable to other instructional settings; it creates a forum which brings all design disciplines and/or the design practitioners together to increase design understanding, public appreciation and involvement in this important subject.

Course Content and Teaching Strategies

Two major strategies have been developed to address the wide range of issues and values that emerge from discussion of a subject with such extensive and evasive scope. First, a conceptual framework was developed from Levels-of-Integration Theory that provides a clear but flexible organization for discussion, analysis, and personal involvement. Second, a collaborative, interdisciplinary team was put together to teach the subject. In this way, the complex issues common to design education and practice are presented to beginning design students and to students who make up part of the general public.

In collaboration with all the design disciplines, we have established a clear lecture format, with numerous multi-media, team presentations. The team has collaborated on the development of a workbook/textbook and a set of 10 experiential assignments. To encourage more personal exploration in related fields, we also offer options which include personal directed study, participation in workshops, and attendance at guest lectures and seminars.

A self-involving correspondence course option has just been developed to once again encourage the general public to be more aware and involved in design of the built environment. The program has just received a national award and we have students in Europe, the United States and Canada beginning to explore these important issues within their local environment.

As emphasized above, selected integrative concepts are the foundation of the course. A conceptual organization built on hierarchy theory ties the subject material together, while the content is flexible enough to adapt to changing faculty, student and environmental dynamics. The organization integrates the following interrelated segments.

I. DEFINITION AND EVOLUTION OF THE BUILT ENVIRONMENT: This segment introduces the scope and inclusive definition of the subject. It also explores the historic developments and traditions which have occurred throughout the region, nation and world.

II. CENTRAL ISSUES: HEALTH, FITNESS AND CREATIVITY IN HUMAN-ENVIRONMENTAL INTERRELATIONSHIPS: This segment explores the basic ecological relationship between people, the things they create, and the resultant environment. Integrative devices are introduced for organizing the complexities of the natural and built environment. Health and fitness emerge as useful, qualitative dimensions of creative human-environmental relationships.
III. INTEGRATED COMPONENTS IN THE BUILT ENVIRONMENT: The third section, the largest, deconstructs the built environment into seven selected components within a levels-of-integration framework. This section explores in greater detail the dual human and environmental aspects of each component. More specifically, it defines each of the following components, explores their historic precedent and concludes with a reconstructed study of contemporary issues and future challenges.

Selected Components and Related Design Disciplines

1. Products. Product/Graphic/Industrial Designers
2. Interiors. Interior Designers
3. Structures. Architects and Engineers
4. Landscapes. Landscape Architects and Planners
5. Cities. Urban Designers and Planners
6. Regional. Regional Planners
7. Earth. Environmental Scientists, National and Global Planners

Within the integrative conceptual organization and interdisciplinary forum, local professionals can make significant contributions to the collaborative program. Format and organization are effective reminders of the inclusive, interdisciplinary and integrative framework. These three central qualities are developed in greater detail in the following section of this paper. Students really understand these simple conceptual ideas and get more and more enthusiastic as components build one upon another (in the course and in their minds'-eyes) to form the overall built environment.

A Paradigm for the Built Environment: Inclusive, Interdisciplinary and Integrative

The course emphasizes that creative integration is a key problem in design today, an emerging contradiction of individualistic attitudes that have dominated society and the design disciplines too often in the past. It provides a vehicle to illustrate that integration can be achieved. Educational and personal linkages are established in the course that could profoundly influence the theory and practice of all design disciplines. The difficulties of achieving integrated design are explored in school before they are carried by another generation into society and professional practice. The reader can identify three simple integrative devices in the course outline illustrated above. The three are presented separately, but by definition are themselves integrated and interdependent. They are:

1. an inclusive definition of the built environment: consideration of all the artifacts and modifications of human creativity (of designers and users together) in total as the "built environment."

2. interdisciplinary involvement from faculty and students which addresses the role of all the design disciplines, individually and together.

3. an integrative framework for the course to interconnect subjects, concepts and disciplines and create a means for analysis and synthesis.
An Inclusive Definition of the Built Environment

The "Built Environment" has been around as long as humans have been making objects and shaping their surroundings. It is pervasive and relevant to all that live in the human-made or arranged world—all who live on this planet. The products, interiors and structures humans build, the landscapes and cities they form, even aspects of regions and the world redefined by people are the results of human-environmental interactions. They are of human creation, therefore can be considered as interrelated components of the built environment. The built environment conceived so inclusively is a useful teaching concept because it can be easily appreciated and clearly understood in relationship to the integrated scales of design presented in the course.

To effectively communicate these ideas to young students, the design educators in the course established a full range of integrated components—from product to world—as the minimal definition of the built environment. The first characteristic of the built environment, defined inclusively, is that it is extensive; it is everywhere; it is here—and it is global; it is everything humanly created, modified, or constructed, humanly made, arranged or maintained. A second characteristic of the built environment is that it is created to protect us from the overall environment, to mediate or change this environment to fulfill human purpose—to satisfy human needs, wants and values. Finally, an obvious, but often forgotten dimension or characteristic of the built environment is that human created objects affect their surroundings; objects either contribute to or detract from their contextual setting.

The inclusive definition is diagrammed below to help visualize and define the range of human-built-environment relationships. Symbols are useful in imprinting a concept onto student memories.

The Built Environment is everything humanly made, arranged or maintained.

To mediate the overall environment.

To fulfill human purpose (needs, wants and values).

And it effects the environmental context.

The inclusive definition and unified symbol help students conceive and visualize environmental relationships into one integrated concept. Similar symbols, with a similar aim in mind were used by Leonardo da Vinci in the 15th Century and by James Marston Fitch and the United Nations Habitat Organization in the 20th Century.

Students in the course react to this inclusive definition in two ways. First, they are interested and excited by exposure to the scope of human endeavor. Second, the definition helps direct this newly awakened interest to the fundamental interplay between human needs and values, the artifacts we create, and the resultant built and natural environment. The apparent
complexity of a subject takes on purpose and meaning to them and eventually to society.

Interdisciplinary Involvement

The built environment is the product of many human minds and hands over many centuries. As a result, it is a complex subject that can be—must be—viewed from a variety of perspectives. All environmental issues are best understood and resolved in an interdisciplinary forum of ideas, information and creative processes.

This variety is deliberately reflected in the students and faculty who collaborate and teach the Built Environment course. From the beginning, for over a decade, architects, interior designers, landscape architects, regional planners, and environmental scientists have been involved as instructors. The course is very much a collaborative effort, emphasizing not only the contemporary built environment, but its creation in a historical and evolutionary context. Also, all design students take this course at the pre-professional level, before they have been admitted as majors. This means they are exposed early to their counterparts and to faculty in the other design fields. Their last step before majoring in a professional design discipline is to an inclusive, integrative, interdisciplinary perspective on the built environment.

An Integrative Framework: Levels of Integration Theory in Design

Contemporary critics of the reductionist or individualistic methods of science, engineering and design have become increasingly vocal in recent years. They claim that reductionistic methods, necessary (and successful) as they certainly have been, tend to isolate entities and deemphasize connectivities. This fragments our concept of the built environment. Regardless of the validity of such a charge, designers and systems scientists have responded with attempts to insure that connections are restored by integrating the parts to their functional whole. For the design disciplines, the task emerges to look at the total synthesis. A device for integration is needed, one that will allow designers to relate the numerous "parts" to the whole environment. Hierarchy theory or levels-of-integration provides that organizing framework for complex subjects as well as a framework for integration and life-long learning.

Hierarchy theory has been used for centuries in attempts to illustrate relationships, to outline sequence, and to characterize connections. Leibniz, in the 18th Century, claimed that "the whole of matter is connected, a connection of all created things with each, and of each with all the rest." Hierarchies make complex subjects more understandable and more meaningful. A reductionist view of the world confines and limits capable minds. Hierarchy theory provides students with glimpses of a wider, more diverse and interesting world.

The artist Francois Molnar (1966) has called lack of integration the "fundamental problem of the plastic arts." He emphasizes the need for designers and builders to seek an understanding of the whole as well as the parts and to recognize that the two are intimately connected. This provides a mandate for an integrated, interdisciplinary approach, a framework for fitting all human creations together into an inclusive, unified built environment.
The concept of integrated levels is a fundamental foundation of lifelong learning. It is not only derived from the past, pervasive in all educational inquiry, but is a basis for contemporary synthesis. Trancik (1986) states that in the analysis of historic precedent, three approaches to design theory can be identified. Each approach has value, but the optimum brings all three together so that each design must be a response to these interrelated theories. Taken together (as layers or levels), "they provide potential strategies for integrated urban design." Alexander's (1987) concept of a new theory of urban design is also based upon this provocative concern for "wholeness," a profound concept of integrated levels. Alexander states that "Every building increment (large or small) must help form at least one larger whole" within the continuum of design levels.

The beginning design student finds such concepts difficult. Their past educational experiences do not encourage integrative, holistic ideas. Through the use of concrete examples and experiential exercises, however, they come to see the simple organizational elegance in the levels-of-integration concept. It becomes an exciting and powerful tool that they learn to use throughout the course. Feedback indicates that they use it in advanced design courses and in professional practice. The intention is that it is a basis for a life-long inquiry.

Other cognitive characteristics of levels-of-integration are useful to students as well as the environmental design professions. Any hierarchy is connective and establishes relationships between the parts and wholes, between disciplines and the built environment. Understanding this allows one to function at any level, to analyze the content or parts and synthesize the parts into their larger context. Any hierarchy establishes content-component-context relationships, and this is the basis for analysis-synthesis thought processes.

This integrative model of the built environment can be understood as "layers" or "levels" of varying scales interwoven together to form the built environment. This layering concept is illustrated in the diagram or logo. (Designed by J. Singleton and S. Recken.)

The listing and description of the seven selected components illustrate an important overall theme—the interrelationship of each component to each and all the others. Each part is made from the combination of smaller components. Conversely, each component is a part of the next larger component. This hierarchy is a useful systems model for organizing and studying the parts and wholes of complex subjects.

The Means of Assessing Student Understanding

The course is challenging to teach. Creative understanding of and involvement in the complex characteristics of the built environment is difficult to measure. When the course had an enrollment of 20-30 students, the assessment of student understanding and personal involvement was easy to achieve. Students responded well to its content, conceptual organization and its seminar-field experience teaching strategies. Now that the course has
Attracted more students (current enrollment is 327), we have developed an integrated lecture workbook lab format. (Reference attachments: course outline, requirements and selected student assignments.) The lecture-workbook segment is evaluated by participation and examination. The field laboratory experience is assessed by student performance on ten (10) "experiential assignments requiring personal observation and evaluation of their background and values, and the surrounding campus, community, regional and global environments." To encourage more personal exploration in related fields, we also offer extra credit options which include personal directed study, participation in workshops and student design presentations, attending guest lectures, etc. Periodically, depending upon extra faculty involvement and funding of teaching assistants, we have offered an optional seminar which fosters more personal discussion, involvement and field experiences.

Conspectus

A useful forum to effectively test and integrate design ideas is close at hand: the human is you and your constituents--the environment, built or natural, is locally accessible for observation and participation. Individuals are challenged because it encourages them to get their own act together. Rene Dubos stated the challenge bluntly: "Think globally, but act locally." But how? The integrative devices discussed in this paper have provided a successful response to that challenge in the classroom.

The simple integrative devices present the built environment in a way that is inclusive and interdisciplinary and have profound implications for design education. They celebrate collectively the life supporting qualities of the built environment. They deny the separation and autonomy of individual designers and of individual disciplines. They provide a model through which product and interior designers, architects, landscape architects, and planners can all see where their discipline and approaches interrelate—one to another. They encourage integration of the design disciplines, integration of thought processes and integration of the resultant components of the built environment. The ultimate result should be a creative foundation for professional development and life-long learning.

References


The interdisciplinary team of faculty members are noted in the text/workbook. Current course enrollment is 327.

THE BUILT ENVIRONMENT

INDEX AND COURSE OUTLINE (Faculty Involvement)  
ARCH/10/LA 202  
SPRING SEMESTER 1988

1. INTRODUCTION, DEFINITION OF THE BUILT ENVIRONMENT

Jan. 12 1. Introduction (Bartuska & Young). 11-11
14 2. Definition and Scope: The Extent of the Built Environment. 1-11
19 3. Historic Perspective on the Built Environment (Matthews). 14-23

II. CENTRAL ISSUES: HUMAN-ENVIRONMENTAL INTERRELATIONSHIP

Jan. 21 4. The Environment (Young). 11-11
26 5. The Built Environment: An Introduction (Bartuska). 51-59

III. COMPONENTS (LEVELS OF INTEGRATION) IN THE BUILT ENVIRONMENT

Feb. 4 8. The Humanly Made Object (Bicknell). 89-96
9 9. Industrial & Graphic Design Today (Snowden). 97-104
11 10. EXAMINATION NO. ONE (REVIEW: TUESDAY, 9 FEBRUARY, 7:30 PM). REVIEW

11. STRUCTURES ... ARCHITECTURE & ENGINEERING

Feb. 16 11. Interior Design As An Expression of Its Age (Silverstein). 107-115
23 13. The Quest for Shelter (Samit). 124-134

4. LANDSCAPES ... LANDSCAPE ARCHITECTURE

Mar. 10 14. Landscape Architecture Through Time (Hsu). 209-238

SPRING VACATION (MARCH 12 - 19)

22 19. Landscape Architecture Today: Definition and Directives (Hsu). 209-239
29 21. EXAMINATION NO. TWO (REVIEW: THURSDAY, 24 MARCH, 7:30 PM). REVIEW

5. CITIES ... URBAN DESIGN & PLANNING

Mar. 31 22. The History of Urbanization (Petton). 261-266
Apr. 5 23. The Inherited City as a Resource (Baron). 267-281
7 24. Cities Today (Bartuska). 282-304
25 25. Urban Planning and Design (Owen & Cities & Regions (Young). 305-320

6. REGIONS ... REGIONAL PLANNING & MANAGEMENT

Apr. 14 26. Definition of Regions and Regional Planning (Ribe). 323-342
19 27. Regional Management: By-Products of the Built Environment (Budd). 343-355

7. EARTH ... GLOBAL POLICIES, PLANNING & MANAGEMENT

28 29. World Community (Young). 363-370

IV. A CONSPECTUS ON THE BUILT ENVIRONMENT

Apr. 28 30. Conspectus and REVIEW (Bartuska). REVIEW

*** FINAL EXAMINATION (See University Schedule). REVIEW
(REVIEW: THURSDAY, 28 APRIL, 7:30 PM).
ATTACHMENT 2. EXPERIENTIAL ASSIGNMENTS
SPRING SEMESTER 1987

The 10 field experiential assignments encourage student involvement and personal discovery. They are organized to enrich each of the basic components of the course. Collectively, they provide an effective and enjoyable survey mechanism to determine class attitudes and perception about the local built environment. Many improvements have been made through this survey process. Also they are useful in exploring and comparing students personal values and potential career opportunities.

PSYCHO HISTORY

Describe the environment which you grew up in (approx., age 6 to 10), i.e., size and nature of city or town, quality of environment, kind of dwelling, surrounding and influential attituves about environment (natural and built), etc. Describe the experiences that you have had in interacting with the built or unbuilt environment, i.e., construction work, forest service, community action programs, travel, backpacking, etc.

MENTAL "FREE MAP"

Draw a diagram of your "affective" environment. Use a dark pen (i.e., black ink) for the first 1/2 of the exercise. After the first eight minutes, change to a lighter tone drawing instrument (i.e., pencil). Take about 15 minutes total. Make this a spontaneous exercise. After you have completed the drawing, read page 1/12.

The student's "personal or psycho history" and background is an important influence on their perception of urban, suburban and rural environments, their sense of scale and interest in design.

The student's "Mental Free Map" conveys their perception, general background and interest in various environmental scales as well as potential career choices.

OVERALL QUALITY OF THE COURSE WAS OUTSTANDING, ALTHOUGH I HAVE NOT HAD MANY CLASSES IN THE ARCHITECTURE DEPARTMENT. QUALITY HAS GIVEN A MAJOR CONTRIBUTION TO MY LEARNING ABOUT "THE BUILT ENVIRONMENT."
5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT
University of New Mexico/School of Architecture and Planning  2414 Central Avenue S.E., Albuquerque, New Mexico 87106  505/277-2903

Offered through the Research Office for Novice Design Education, LSU, College of Art and Design, School of Architecture.

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APRIL 8 & 9, 1988

NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT (5th: 1988, Albuquerque)
INTRODUCTION TO ARCHITECTURE
Innovation in Teaching Beginning Students

5th Annual Conference on the Beginning Student
School of Architecture and Planning
The University of New Mexico
Albuquerque, New Mexico

April 8-9, 1988

Thomas Walton Ph.D. and Milton Shinberg AIA
Department of Architecture and Planning
The Catholic University of America
Washington, D.C.
(202) 635-5188
In framing this Introduction to Architecture, we challenge two profound academic assumptions: first, that a student is a blank slate, TABULA RASA with no beliefs or prejudices except those that must be wiped clean before REAL LEARNING may begin; and second, that this same student learns best when taught THE SIMPLE at the outset, adding THE COMPLEX over time.

The reasons for discarding the TABULA RASA assumption are twofold. On the one hand, it is simply not true. Students come to college with seventeen or eighteen years of extensive experience. They may not be articulate about it in abstract terms, but they can describe the differences between a good environment and a boring or bad environment; they can identify cities that are livable and those stifle the human spirit; and they have strong ideas about design and express these in the clothes and "look" they wear and in the spaces they make for themselves in the dorms or at home. Ignoring such an abundance of talent and enthusiasm is a missed opportunity. In this context, respect becomes a second important rationale for abandoning the TABULA RASA thesis. When developing a curriculum, it behooves us to acknowledge and exploit experience, a link not only with students but also with the public-at-large (we refer to this group of people as clients) and use this as a base for expanding sensitivity to design issues and a sophistication in addressing design problems.

The second assumption, that learning should move from THE SIMPLE to THE COMPLEX, has been challenged by several diverse areas of research. One of the most prominent is the study of language acquisition by infants. Everyone recognizes that language is a highly complex system. However, we also know that infants learn best and most quickly when they are "led" by speech more advanced than their apparent ability to emulate. The same approach holds true later in life as evidenced by the "total immersion" techniques used by the Berlitz language schools and the linguistic training of Peace Corps volunteers. What this suggests is that starting with THE COMPLEX may suit our evolved brains better than the piece-work, assembly line method that naively begins with THE SIMPLE. It is now believed that infants possess a richly structured framework "set" to be filled by certain pre-defined categories of experience that come to them early in life. And, if infants can so fully and easily acquire synthetic knowledge, how much more so can our beginning students? To put the matter bluntly, why should we treat these young adults as less educationally trustworthy than newborns?

Perhaps the easy mistake we make is to confuse acquisition of technique with processes that increase wisdom. What we should strive for is a program that allows students to refine the vast body of experience they bring with them on
In this sense, architectural education must be seen in a different, less mechanical way. We might even ask whether technique itself could be more effectively taught via THE-COMPLEX-to-THE-SIMPLE model. After all, it is the synthesis of issues that makes great architecture, and it is not unreasonable to expect that teaching should mirror the outcomes we hope to achieve.

It is the premise of our course and this paper, then, that a different kind of Introduction to Architecture is more appropriate and more successful. Further, we contend that this significant shift in attitude and methodology may have other profound consequences for our profession. For instance, we surmise that students may ultimately be better designers and architects when allowed to contend with major professional issues before starting their studio sequence. We are also convinced that the alienation between architects and clients, or more broadly, the alienation between architects and the general public, may well be reduced by helping students examine their important and quite valid "pre-trained" views rather than by supplanting these sincere but fragile convictions with an onslaught of abstraction that they can recover from only by embracing the life preserver of the profession's established beliefs. There is every reason to believe, particularly in the last few decades, that public wisdom sometimes equals or exceeds accepted norms and rules. Thus, in the final analysis, we might be more responsive professionals if, in addition to teaching the students, we allow the students to teach us.

GOALS

From these ideas, we have developed an innovative and somewhat controversial INTRODUCTION TO ARCHITECTURE. Ours is a gateway course based on the crucial assumption that we want to broaden and enrich our students' talents and perceptions without sacrificing the initial enthusiasm or confidence they have in their own, sometimes unique insights concerning the built environment. They should emerge from the course with an ability to articulate both the descriptive and causal realities they encounter in buildings and cities. They should be able to identify and evaluate the attitudes that affect their conclusions and be able productively to exchange points of view with others who understand design differently. They should be somewhat familiar with professional issues in architecture, the roles and options of various players, and the conventional process and sequence of addressing architectural problems. They should recognize the diversity of architectural practice, and the variety of tools traditionally used and newly emerging in our field.

METHODOLOGY AND STRUCTURE

To achieve these objectives, we have structured this introduction around a creative blend of discussion, lectures, readings, field trips and hands-on experience. These are designed to encourage and nurture the students' abilities to explain, refine and extend knowledge and skills they already have. All exercises -- photos, brief essays, responses to questions that accompany each reading, and the construction of simple models -- can be done by majors and non-majors alike and require no special graphic skills. Not unexpectedly, within this process, there is a precise order.
Believing in the validity of starting with THE COMPLEX, the first component of the course deals with an analysis of urban form. Lynch's Image of the City provides a highly accessible and generally intuitive system for analyzing the large scale environment, and students easily relate this to their experiences of campus, home towns, and other places they have visited, from small villages to great metropolises. Lectures on the history of urbanism and the development of Washington, D.C. (where The Catholic University of America is located) complement the dialogue among those in the class. Finally, critical concepts are put to the test when students form teams to take photographs, map key visual features and prepare a written neighborhood analysis and subsequently play a more abstract design-a-city game where the traditional aspects of planning are discussed.

The second phase of our course focuses on perception, the elements of design, design as problem solving, and techniques for using criticism and analysis as tools to enhance creativity. Here, the first lecture outlines how vision -- the way we actually see, including issues such as contour/contrast, motion parallax, gradient and perspective parallax (all of which, incidentally, emerge during infancy) -- is intimately tied to the definition of beauty. This is followed by a presentation on the many design options and materials available to architects and by a third, more general lecture on design as a creative problem-solving process, be it figuring out what to do on a date, how to plan a city or build a home for your parents. Readings are taken from Bloomer and Moore's Body, Memory and Architecture and Rasmussen's Experiencing Architecture, and exercises and discussion revolve around the construction of several conceptual space models and the creation of collages to express certain specific and powerful architectural images.

The profession is the last major topic in the course: What is the role of the architect? What are the steps as you move from design through construction? How do you deal with clients? What technological innovations are affecting the profession? Who are and who have been important heroes and models? What are some of the recent design theories? Salvadori's Why Buildings Stand Up and Blake's The Masterbuilders are texts during this time but this academic effort is supplemented by a range of interesting field trips -- evening lectures by practitioners, a one-on-one interview with an architect, a visit to an office and CAD demonstration, and a special tour exploring a construction site.

To synthesize all this work, the students are given final projects where they must present significant local buildings as if they were the design architects. It is an exercise where each person must convincingly explain to peers -- as well as to instructors -- what has shaped the design and identify why it has succeeded or failed. They study context, propose a design philosophy for each commission, and offer a thorough commentary on form and detail. In this way they are able, with surprising sophistication, to fine tune and articulate the critical abilities and insights that have been developed throughout the course. It is a satisfying end to the semester.

RESULTS AND CONCLUSIONS

This INTRODUCTION TO ARCHITECTURE is too new for exhaustive evaluation. Originally conceived a couple of years ago, it was significantly modified
during the Fall of 1987. Since only one class has completed the revised course and a second is almost finished, at this point, we have only reached general conclusions.

To the extent that maintaining enthusiasm is a prime goal, our strategy is successful. The quality of work is high; students have moved on to the studios with confidence; course evaluations are enthusiastic; and growing numbers of non-majors are taking the class as an elective.

Beyond this, we have another interesting way to measure results: the final project itself. This exercise is entitled Critical Viewpoint, and is presented orally by each student as well as in report form with models and graphic analysis. It is evaluated for completeness, degree of synthesis, and persuasiveness. It is not necessary that the analysis be historically accurate; rather, we ask that students present an intelligent and cohesive case based solely on observable conditions. And, as the project is reviewed by teachers and students together, class comments are considered important in gauging the quality of the work and the new wisdom it conveys. Obviously, this requires a talent for synthesizing many issues and most of those in the course did quite well (some extraordinarily well). This indicates to us that we not only provided an opportunity for individual success but created an approach that was, in and of itself, successful.

In the other assignments we stressed ideas and analysis, and our assessments aimed at intellectual clarity, not graphic skills. As mentioned earlier, weekly readings were complemented by questions that required in-depth expansion on the author's concerns. These were collected periodically and received detailed comments. Short projects are given weekly, reviewed in small group discussions and graded for content. Overall, these activities were pursued with seriousness, and even elegance.

As teachers, we have been impressed by the sophisticated analytical talents of the freshman students, both majors and non-majors. This is particularly true in comparison to their classmates in later years. It is for this reason that we suggest that perhaps delaying the start of the studio experience and its collision with the difficult process of design offers that all important first chance to see the forest instead of just individual trees, beautiful as each can be.
5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT
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Student  (5th Conference on the Beginning Design Student)
ABSTRACT

The objective of the introductory Environmental Design Studio, ENVD 100, is the development of design fundamentals and the cultivation of environmental awareness. Design fundamentals are introduced and developed at several levels within the areas of perception, analysis, manipulation and transformation. They are supported by parallel development of visual representation and communication skills. The concept of environmental awareness recognizes students' vernal experiences and memories as a viable source of design content, especially as it relates to the understanding and development of meaning in environments.

This paper describes the objectives and organization of three foundation level design projects, which investigate the role of meaning in environment: “FADS,” “FAST FOODS” AND “FAIRY TALES.”

These projects involve entry level students in realistic and abstract problems which develop analytical as well as inventive problem solving skills. “FADS” and “FAST FOODS” are projects linked to current and mainstream cultural and physical issues, which are explored in 2-D and 3-D environmental context. “FAIRY TALES” plays on students' past experiences and memories and requires them to investigate, interpret and transform issues of movement, space and experience in relation to sequential themes resolved in 3-D architectonic elements.
A central focus of the design education at the College of Environmental Design, University of Colorado, Boulder, is the understanding of the relationships between non-physical processes and the physical environment. Design involves acts of development and intervention in this environment (man-made or natural) through decision making and creative thinking. The College is structured into a Lower Division (Foundation) Program and an Upper Division (Emphasis) Program. The Foundation program provides students with a basic introduction to concepts, skills, and processes in major areas of design (Design Studio/Representation and Communication Skills/Societal Factors/Natural Science and Technology/History and Theory). The Emphasis Area program allows students to develop concepts and skills in environmental design by selecting courses which focus on a specific design field (e.g., Architecture/Urban Design/Planning). The content of a particular discipline is used as a means of developing a general environmental design competency toward a pre-professional undergraduate degree.

The purpose of this paper is to describe the objectives and organization of three Foundation level design projects, which investigate the role of meaning in environment: “FADS,” “FAST FOODS” AND “FAIRY TALES.”

These design projects are from the first semester studio in the Foundation program. It is important to note that this studio is open to non-majors within the University, as is a complimentary Environmental Design Perspectives (survey) course. These courses are not only introductory to our majors but, provide a University wide recruiting opportunity.

FOUNDATION DESIGN STUDIO I

This studio is structured to accommodate a wide range of curiosities about environmental design. The primary objectives are: (1) the development of Design Fundamentals; (2) Representational and Communication Skills; and (3) the cultivation of Environmental Awareness.

Design fundamentals are introduced and developed at several levels within the areas of perception, analysis, manipulation, transformation and synthesis. These are supported by parallel development of visual representation and simulation, and communication skills.

The realization and cultivation of environmental awareness not only acknowledges students’ vernal experiences and memories as an undeniable source of initial design comprehension but, nurtures this awareness through observation and discovery in their environment. This will not only assist in developing understanding of and response to meaning in environments but, mature the ability of these designers to impart meaning into the environments they create.

The basic content of these primary objectives is presented in the following:

DESIGN FUNDAMENTALS

* Development of a design vocabulary of the formal, natural and social characteristics of environments.
* Introduction of elements of formal organization and composition.
* Introduction of scale and proportion as elements of measurement that relate humans to the physical environment.
* Introduction to the concepts of analysis, progression and transformation in the development and manipulation of environments.
* Introduction to the idea of system; conceptual, spatial and structural.
* Introduction to some of the basic ideas of process: problem solving, decision making, generation of alternatives, evaluation, synthesis.

REPRESENTATION AND COMMUNICATION SKILLS

* Development and integration of media and technique in 2-D: freehand drawings, sketches, diagramming, limited technical drawing and rendering.
* Development of 2-D composition: field/image relationship, strategy and the importance of “idea.”
* Development and integration of media and technique in 3-D: simulation, study models and presentation models.
* Development of verbal and presentation communication skills.
ENVIRONMENTAL AWARENESS
* Development of a basic understanding of the relationships between non-physical processes and the physical environment.
* Understanding of meaning in relationship to experience and knowledge of history, poetry, literature, mythology, culture, social status, style, etc.
* Reading of meaning in environments and the relationship between meaning, use and desire.
* Perception of intrinsic and extrinsic content 2-D graphic imagery and 3-D physical simulation.
* Understanding that the product of environmental design does not necessarily have absolute value but, is valued in terms of human apprehension, comprehension and performance.

COURSE STRUCTURE
The Foundation Design Studio is organized and instructed through a Level Coordinator and three to four section instructors. The coordinator is responsible for the overall development, content and activity in the studios. Exercises and projects are developed through the collaboration of these permanent and adjunct faculty.

Beginning activities include the development of visual syntax and representational skills in the form of numerous sketching and drawing exercises. These exercises explore the elements of effective freehand drawing: consistency of technique, sense of space, line weight, tone, contrast, focus, balance, symmetry, etc. and compositional strategy. In addition, majors are required to take an introductory Fine Arts drawing course.

Beyond this introduction, the course consists of a series of design projects, similar to those presented in this paper. Each project is intended to stand on its own (i.e., to have a beginning, a middle and an end) and, each is intended to build on the concepts and skills developed in the previous project.

THE PROJECTS
The following projects are selected for discussion as they most directly relate to the objective of development in the area of environmental awareness. “FADS” and “FAST FOODS” are projects linked to current and mainstream cultural and physical issues, and are explored in 2-D and 3-D environmental context. “FAIRY TALES” plays on past experiences and memories of fantasy. The interpretation and translation of sequential motifs within the fairy tales is transformed into a 3-D architectonic experience using and manipulating the base elements of spatial form.

“FADS”
In the project I have titled “FADS,” students are asked to analyze and transform a contemporary advertisement. The chosen advertisement should present clear associations with social status and style. The ads are not simply looked at as the marketing of a product but, as a carefully composed assemblage of verbal statements and visual imagery which markets as much through its subliminal as through its overt message.

A designer must have the ability to describe and to evaluate environmental situations. The skills of analysis and interpretation enable us to not only understand our own experiences in the environment but, to eventually perceive the experiences of others. The 2-dimensional composition is made up of a number of inter-relationships, some deliberate and some not but, regardless of the “consciousness” of the composition in question, real relationships will exist.

The first phase of this project is the analysis and interpretation of the formal and semantic content obvious or implied in the advertisement. The following are compositional qualities the students are asked to identify: figure/ground, layering, balance/symmetry, movement, rhythm/repetition, tension, contrast/tumality, and proportion/hierarchy. In this analysis the students are to question the inter-relationships between objects, how they work together and how the advertised item is related to a spatial and/or temporal context. The second half of this first phase is the analysis of the meaning behind the images that are used in the ad composition. We attach meanings to words and we attach meaning to images and forms as well. These meanings, or semantic relationships, are primarily derived from our cultural conditioning. They express our values and priorities, they represent the language of meaning that we use to interpret
the world around us. Students are asked to look at both the word to word and the word to image associations and derive the key word descriptors that are evoked by the ad. These are then defined in their own words and a hierarchical relationship established. Following this same format, students are asked to look at the visual images (both explicit and implicit) to be found in the ad, and to expand on their meaning and interpretation. These are to be communicated in a hierarchical relationship as well. This analysis information is presented in mixed media on an 18” x 24” board, including the original advertisement.

The second and final phase of this project requires the student to synthesize and transform the analysis of the ad’s formal and semantic content into a new composition. This final composition is to illustrate the student’s ability to manipulate both the compositional and the semantic qualities of the chosen ad. It is suggested that the transformation be made through the use of amplification and/or reduction. Amplification may enhance or exaggerate certain formal, spatial, temporal or cultural associations. Reduction can be used to reduce formal or semantic connections to their most essential elements or abstractions. This transformation is presented in mixed media on a 18” x 24” board.

“FAST FOODS IN THE STRIP CITY”

In the project “FAST FOODS IN THE STRIP CITY,” students investigate two unique aspects of the American landscape: STRIP CITY and FAST FOOD restaurants. The contextual situation is unique in character; it is a linear organization of shallow development along a major road or highway, accessible and perceived primarily by the automobile. This environment is active day and night and composed of numerous nationally or regionally franchised commercial or service establishments. Common among these establishments are the various fast food restaurants. These unique American landmarks have evolved over time to intrinsically efficient food delivery organizations that project carefully development regional or ethnic imagery about the products and services they provide. Today as in the past, they respond to a mobile clientele served conveniently in a truly modern American context.

As I indicated earlier, this project and the “FADS” project both relate experientially to current and mainstream American environmental entities. “FAST FOODS” utilizes past and current experiences and intentionally awakens some new environmental awareness. Analysis is directed to the investigation of aesthetics in the STRIP environment, ordinary and potentially “ugly.” This analysis involves the reading of meaning in the environment and the understanding of the relationship between meaning, use and desire.

Observation and analysis raise the issue of “style” in this environmental context. This parallels previous project activities in that the imagery of the FAST FOOD restaurant is similar to the semantic content of the advertisements in “FADS.”

The project is executed in two phases, the first involves the analysis of the built environment and its unique contextual situation, and the second is the design of a future FAST FOOD prototype. In the analysis phase students are asked to investigate the aspects of imagery, style and gestalt related to a real franchised fast food chain in a strip city context. The specific elements of analysis include the following: type of food and imagery of food, graphics and franchise identity elements, the clientele, interior and exterior design elements and the contextual relationships. This is to be composed into a mixed media, 2-D graphic board presentation. The content is to amplify the imagery and style of the chosen franchise. This is similar to the transformation phase of the “FADS” project.

In the second phase, each student is required to design a prototype FAST FOOD restaurant for the year 1996. The design focus is the essential imagery of the new or redesigned franchise based on developed design criteria and reflecting previous analytical content. Students only generate an exterior formal response in imagery and style, in a sense this emulates a “packaging” development. The representation of this new prototype is in the form of a cardboard box similar in nature to those in which kiddie meals (e.g., McDonald’s “Happy Meals”) are served. The form must be made out of a single continuous piece of card stock, folded together and joined by tabs or glue. Students are required to present an ink drawing of the flat form configuration and a fully articulated model of the FAST FOOD prototype. This model is set on a contextual base and backdrop for final evaluation.
The objective of this project is to use basic architectonic formal elements to define a pathway of movement and to create a sequence of spaces through which a child of 4 to 7 years of age is to move. The project asks the students to select one of five given tales (Cinderella, Hansel and Gretel, Little Red Riding Hood, Snow White and Sleeping Beauty), to analyze this tale and finally to translate it into a 3-dimensional environmental experience.

Environments are experienced through our movement in space over time. Our perception and recognition of environment is an experiential phenomenon. The understanding of and response to form and context involves the comprehension of relationships between the elements of form, the context in which they reside or create, and the meaning they impart.

In creating physical environments, designers work with the physical elements of space, structure and enclosure to manipulate the spatial experience of the audience or user. These experiences have certain similarities in structure to those of music, dance, theater, cinematography and literature. Through composition and choreography the experience unfolds by means of our sensory capacities over time.

"Fairy Tales" translates the activity and meaning evolved through narrative into a program for the development of a spatial experience. The fairy tales are classic in that they are the Brothers Grimm versions of "folk tales." Each contains numerous thematic motifs, as well as polar oppositions which eventually resolve themselves through the tale. Bettleheim's, "The use of Enchantment," is used as analytical input for the identification of the motifs and the interpretation of content within the tales. The students' identification of these "key motifs" and polar oppositions and their analysis of the implied relationships sets the stage for student development of an architectonic organization of dualities played against one another in a spatial sequence. In his discussions, Bettleheim talks about the thematic issues of: good vs. evil; optimism vs. pessimism; fantasy vs. reality; etc. In the formal composition students design spatial sequences composed around spatial dichotomies (e.g., open vs. closed; light vs. dark; ordered vs. random; ascending vs. descending; etc.) which relate to the motifs and oppositions derived from the tale.

Certain parameters are established for the execution of the project, they are the following:

- Theme -- single fairy tale using all or just a few of the central motifs.
- Architectonic Dualities -- development of pertinent dualities and choice of appropriate ones for use in the spatial sequence.
- Grid -- the design is to be based on a grid of 4 columns by 6 columns. In a 1/4" scale model the columns are spaced 3" on center, and placed on a field of 15" x 18". This along with the age of the child user group establishes the human dimension.
- Walls -- the total length of wall to be incorporated in the design may not exceed 45". Height and contour are open variables.
- Columns -- 4 columns may be removed from the grid, and they may be used elsewhere in the design. Column shape and proportion may be varied but, no column may exceed 1" x 1" in plan.
- Roof Plane -- the roof plane is 9 1/2" x 9 1/2". 50% (max.) of the total area of this plane may be removed.
- Color and Tone -- color and tone may be incorporated in the design, but, may not exceed 50% of the surface area. No images or text may be used.

Studio activity begins with the development of a storyboard which presents the identification of "key motifs" (Bettleheim) in the chosen tale and the translation of these into potential architectonic dualities for use in the design of spatial sequence and formal resolve. It is important the student create a clear beginning, climax and termination to the sequence. This is mapped out in 2-dimensional diagramming.

Conceptual development follows in the exploration of 2-D and 3-D diagramming and simulation to establish appropriate sequences and formal elements. The students investigate and test the variables and constraints of the project to get at viable alternatives. A 1/4" kraft study model is produced and the students receive feedback in a mid-project critique.

In the finalization of the project, the students evaluate feedback information and move into refinement and development of the preliminary solution. Finalization of the project includes a 1/4" presentational model (foam core), including tone and color if developed, and an interpretative drawing which is the plan of the spatial sequence and "illustrations" which clarify the fairy tale motifs that are being translated.
It is important to note that the final formal compositions are abstract in nature and that they are not necessarily derived from a program of functional requirements. In recognizing this, jurors are given ample opportunity to review the project statement and are advised to review the Brothers Grimm versions of the fairy tales as well. The most successful projects not only solve the sequence development and formal translation issues related to a specific tale but, hold their own in formal coherency and composition regardless of the relationship to the fairy tales.

EPILOGUE

As mentioned in the beginning of this paper, the development of design fundamentals, representational and communication skills and the cultivation of environmental awareness are primary objectives of the Foundation Design Studio. These areas of growth support the development of the beginning student's comprehension of design as well as the understanding of and response to meaning in environments.

Environmental awareness recognizes that meaning in design is dependent on our biography as experiential data related to a unique group of participants. This background encompasses our experiences and memories, and our knowledge of environments. This most certainly affects our understanding of and response to environments. Lars Lerup, in "Building The Unfinished," suggests, "an object is a sensation which we may reduce to a definite set of properties: quality, extent, relation, place and time." He adds, that we must think about the object, acknowledge these properties and bring previous knowledge to the situation to perceive it as a meaningful entity.³

Environmental awareness is an interaction not only of environment and student but, also of an inventory of preceding experiences and acquired knowledge. The design projects described, draw (in fact rely) on the students' cultural biography and common experience. They require the student to evolve and to acquire additional experience and knowledge about the environment. This is not only the awakening of awareness but, extension of consciousness. The eventual objective of this activity is, of course, the development of a design logic that imparts meaning in the design of environments, man-made or natural. The final test of the success of this logic lies in society's ability to apprehend and to comprehend the conveyed meaning.

NOTES
1 Allan Wallis, Assistant Professor, College of Env. Design, U.C.B. Originally introduced the projects in this paper, they have been modified slightly in use.
2 Hansel & Gretel, Little Red Riding Hood and Snow White and the Seven Dwarfs- Brothers Grimm, Children’s Literature.
   Cinderella- The Arthur Rackham Fairy Book.
   Sleeping Beauty- Fairy Tales of Long Ago, ed. M.C. Carey.
PROJECT READING LISTS

"FADS"

"FAST FOODS"

"FAIRY TALES"

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National Conference on the Beginning Design Student
ABSTRACT

This paper will focus on a model of teaching beginning students graphic skills through architectural theory. This model reinforces the belief that drawing is a language for expressing architectural concepts, and that the beginning design student should be exposed to this idea. This model grows out of courses that have been taught for beginning students. The course that will be presented is intended for beginning students with little or no design experience.

The bridge between developing graphic skills and architectural theory is addressed in two ways. First, drawing exercises that are intended to develop certain skills (i.e., freehand sketching, rendering, etc.) are always of a significant building or place. Second, in conjunction with the exercises, lectures are given to the class outlining the designer's theory of design, along with examples of their work, and examples of other places that express similar ideas. During the course of the semester, students are exposed to a range of design theories and places, while learning basic drawing skills. The ability for the beginning student to experience design theory through drawing represents an initial step in unifying theory and drawing technique. As a result, the underlying premise for this course is: What is drawn is as important as the skill that it takes to draw.

Based on the above, this paper seeks to address the following questions.

1. Should architectural theory be taught to beginning students?
2. Can graphics, theory and design be taught simultaneously?
3. Can beginning students understand implications of theory while focusing on technical skills?

I. THE PROBLEM

For the instructor teaching beginning students, a vast range of pedagogical models are available. One model suggests that beginning students must learn the technique of drawing prior to being introduced to design. This model reinforces the idea that students must develop fundamental skills graphically and understand how graphic language is used to record buildings or spaces in the environment. This approach stresses techniques of graphic representation, through teaching students
methods of drawing with a variety of mediums. Generally, a combination of freehand sketching, drafting and rendering are utilized as a means of introducing students to the tools and the graphic language. As a result, the underlying premise of this model is that students must learn the technique of drawing, and that the introduction of graphic ability is the primary step in the teaching of design. The principal argument for this method of teaching is that beginning students need to understand that design is achieved through the development of a graphic language. As with any language, students need to understand the syntax in order to understand the language. Thus, a fundamental understanding, and to some degree a mastery of the language, is needed prior to design.

A second model for teaching beginning students is to introduce design and creativity in conjunction with the teaching of graphic skills. This model suggests that students should first be exposed to the realm of design in order to understand what design is and how it is accomplished. This model focuses on teaching design and design methodology, and that graphic abilities are seen as a means to design. As a result, graphic abilities evolve as design abilities evolve. In this model, graphic abilities or techniques will generally evolve at a slower pace than in the previous model. At the same time, this model reinforces to the student the idea that drawings are never pure products, rather there is an element of design in all drawings. Beginning students need to realize that drawing is a means of representing ideas or concepts about places. As a result, the principal argument for this model is that the act of design and the act of drawing are not separate, and therefore need to be conceived as one.

These two models represent poles to a pedagogical approach to teaching beginning students. While there are a number of variations to the models presented above, the basic concern between teaching drawing technique and design remain. Within the construct of the two principal models, there exists a number of models which seek to bridge between technique and design, in order to achieve a balance. This paper seeks to address such an approach.

II. CASE STUDY: THE GIVEN MODEL

While teaching graphics at the University of Idaho between 1983 and 1985, the question of integrating graphic skills and design was raised. The traditional freshman graphics courses which were intended for architecture and interior design students focused on teaching fundamental drawing skills, such as orthographic projection, perspective and shade and shadow. These topics were covered in detail during the first semester. The second semester graphics course focused on rendering techniques, using a variety of mediums. These included pen and ink, colored markers, pencils, zipatone, etc. This approach allowed students to develop good drawing skills. This approach stressed drawing technique over design and theory with the result being students produced quality drawings and renderings by the time they entered the design studio. During the freshman year, students were required to take a basic design course, yet exposure to architectural design was not encountered until the sophomore year.
III. THE EVOLVED MODEL

As a result of the above, there was a desire to integrate design ideas and theory earlier in the curriculum, while maintaining the students' graphic abilities. In order to accomplish this goal, a shift in the subject matter of the second semester graphics course was initiated. The shift involved an introduction of design theory through drawing. The primary intent of the course was to focus on the following points: (1) Introduce students to the realm of architectural theory; (2) introduce students to debates and dialogue regarding architectural theory; and (3) introduce students to some of the important people and events who have generated the dialogue.

The introduction of design theory into the graphics course was seen as important for several reasons. The first is that it would allow students to see that design ideas must encompass a broad range of issues. These include social and cultural values as well as environmental and programmatic goals. As a result, students would become aware that these issues will influence design decisions. Another important reason for introducing theory is that it allows students to understand that for any particular design problem there are a number of different solutions. It is important that students realize there is not a universal answer to architectural design. Rather, design students need to understand that architecture is both a rational and interpretive art. In the beginning years this can be achieved by illustrating how different architects approach similar design problems. Another important premise for this course is that in architecture, learning is fundamentally achieved through drawing. As a result, the idea of learning theory through both verbal and graphic means was seen as a positive development. A final consideration for the course was related to drawing skills. It was felt that if beginning students can practice drawing skills on subject matter that they will study in later years, then the interest in the graphic material will be enhanced. With these basic objectives in mind, the second semester graphics course evolved into the following.

IV. PROCESS

The primary approach to this course was to introduce the students to various architects, architectural ideas and theories from the twentieth century. Through studying these architects and then drawing buildings that they had designed, students would become exposed to architectural ideas and concepts. In addition, students would begin to see that architecture encompasses more than the design of buildings, but includes consideration for social and cultural values. It was seen as important that students understand that architecture is more than solving a set of fixed problems. Form follows function does not equal architecture. Through drawing significant buildings and utilizing drawing techniques, students would be developing graphic skills and abilities while developing a basic introduction to design theory.

During the course of the semester, students investigated a number of twentieth century architects. Corbu, Kahn and Venturi were some of the architects that were presented. Students were introduced to the
architects through a lecture and slide format. The lecture outlined the architects' philosophical beliefs, the social and cultural conditions of the time and examples of their work. During the course of the lecture, a particular building designed by the architect was examined in detail. In this way, students could relate the design theory to a particular place. At the same time, connection with other architects and buildings were presented so that students could begin to appreciate the architect's influence. At the conclusion of the lecture, students would spend a number of class periods drawing a particular building that the architect had designed. Typically, the building that had been discussed in detail during the lecture was chosen. Different presentation mediums were explored with each architect. Efforts were made to correlate to the degree possible the presentation technique with the architects' approach to design.

Corbu' serves as an example of how the architects were presented in conjunction with a particular drawing medium. The study began by students being introduced to Corbu's work. His background, philosophical beliefs about architecture and his influence in architecture were discussed. Students learned and became familiar with the work of Corbu and his ideas. Most importantly, students became exposed to Corbu' the architect and recognized that he has been influential in twentieth century architecture. Next, students were introduced to a particular drawing medium. In the case of Corbu, value delineation using black prisma pencil on boards and 1000H was the medium. A series of short assignments that allowed students to work and develop the medium were presented. These included tone and value studies of different geometric forms and shapes. During the first semester graphics course, students had been taught orthographic projection, perspective drawing and shade and shadow. As a result, the short exercises stressed principals of light and shadow and the correct rendering of objects. Once students had become familiar with the technique and developed a level of comfort, they were then asked to construct a drawing. In the case of Corbu', the Villa Savoy was used as an example of a seminal work. Perspective drawings were developed using the value delineation technique. As a result, students were able to develop their graphic skills while beginning to be exposed to issues related to design.

This typical model was followed throughout the semester and with different architects, media and techniques. At the end of the semester, a final two-week project was assigned. Students were asked to go to the library and research architects from a prepared list. Students were required to collect examples of buildings that the architect had designed and develop a presentation board of a particular building. Required drawings included floor plans, sections, elevations and perspective. Students were allowed to choose the presentation medium from those that had been studied over the semester. The final culmination of the project was that students were required to give an oral presentation to the class regarding their chosen architect and building. The presentation covered not only the building but statements regarding the architect's ideas about architecture.
V. RESULTS AND OBSERVATIONS

As stated earlier, the main intent of this course was to help the students understand that architecture encompasses more than the technical ability to draw. The ability to see and understand the environment through drawings represents the language for design. As a result, the interrelationship between drawing, design and theory is fundamental to being an effective designer. It is most important that students understand that drawings depict a physical place and that the creation of that place is founded on philosophical beliefs about how human beings exist in the environment.

As with any model, it is by definition constantly evolving, which is true here. Observations are that students gained insight into architectural theory and its implications. Students also became aware of some of the people related to twentieth century architecture and how they were influential in creating the built environment. From this process, students began a dialogue among themselves and the instructor regarding the different architects, and different approaches to design. Earlier, it was stated that one of the goals for this course was to generate a level of dialogue and questioning on the part of the students. The introduction of theory in the graphics course was key to achieving this goal. Observations were that students developed a keen interest in studying the architects which enhanced their interest in developing the graphic skills. The result was that graphic skills and quality were maintained, while introducing students to architectural theory.

The focus of this paper has been twofold. The first was to describe a case study for a course that seeks to integrate design theory and graphic skills. The second intent of the paper is to discuss the value and merits of this particular model. As stated earlier, the course that has been described was intended to introduce students to architectural theory, while teaching graphic skills. In reference to the three questions identified during the abstract, the following conclusions can be drawn.

The first two questions, should architectural theory be taught to beginning students, and can graphics and theory be taught simultaneously, can be discussed together. It seems that the question is not should this be taught, but rather how it should be taught. One of the principal objectives for architecture is that it expresses not only the program and the user, but that architecture is a reflection of the needs and values of society. It is fundamental that beginning students realize that their responsibility as architects moves beyond the design of individual buildings. Beginning students need to realize that buildings exist within a certain milieu, and that architecture must be responsive to that milieu. Thus, the fundamental element in teaching beginning design students is to instill the sense of questioning and the notion that design is a process of discovery. This approach can also provide a foundation for instruction in graphic techniques. In this model, teaching students to draw is always related to the idea of representing architectural ideas in a particular context. In this way, drawing technique is always founded in principals of theory and design. Another value of this approach is that students see the connection between
theory and the built environment. This model reinforces the conception that one must develop a theoretical base for design.

The third question, can beginning students understand implication of theory while focusing on technical skills, is most important. This question is difficult to answer since results never measure up to expectations. Yet, the success of this model indicates that beginning students are quite capable of grasping conceptual ideas. Students from this course were introduced to important architects of the twentieth century and became familiar with their ideas. One major goal of this course was for students to take with them not only drawing skills, but a reference for design ideas and concepts. If students can carry with them into the first design studio a framework for design and issues related to design, their ability to grasp architectural concepts and issues will be enhanced.

This model clearly advocates that beginning students be exposed to design theory while learning drawing skill. The significance of this model is that theory and drawing can be taught together and can be complimentary to each other. The integration of theory and drawing confirms that drawing is the language for design.
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This section of papers deals with projects that require students to use decision-making devices by creating hierarchies, setting priorities and selecting "filters".

Turnipseed's Ninja project encourages students to develop strong decision-making philosophies. In this instance, Ninja is the selected "client", and thus provides a coherent, powerful and enlightened world-view through which design decisions are filtered. Stout integrates a historical/theoretical approach with graphic development as students study different periods of architectural history, write up appropriate "manifestos" for that era, and design and draw a building responsive to this manifesto. The manifesto becomes the filter. Doz and Chung use an imaginative project to stimulate students to creative ends. The students work both in teams to create a cohesive city, with common characteristics (requiring a common filter) and as individuals to develop one building within this context. Goodman, Fairey and Paul have developed a unique team-taught interdisciplinary approach, but also have students select a word to embody their personality. This word becomes the filter for design decisions throughout the semester. Forseth encourages students to use structural, mechanical and construction systems as the primary design generators.
As at the majority of design schools, the beginning design studios at Texas A&M University's College of Architecture concentrate on developing an understanding of fundamental principles of design. Although there have been some attempts to standardize design studio content, the unwieldy size of the college has frustrated the development of all but the most broad content criteria for the beginning studios. As a result, individual studio instructors retain considerable autonomy in developing a narrow scope focus within these broad objectives of the introductory design sequence and quite typically view their course as a self-contained unit of instruction with a "leveling" segment that does not heavily rely on an exposure to particular principles in a former studio. Although potentially frustrating to the student, this repetition usually serves to reinforce the most critical design principles. This almost laissez-faire instruction environment produces a smorgasbord of studio projects, ranging from architectural investigations of individual building elements to semester-long studies of evocative words, and typically places the responsibility of information integration on the individual student.

In this pedagogical environment, I teach the second semester of beginning design. My particular interest is that the students receive an introduction to a strong creative design process and that they specifically experience the influence of site and program pattern analysis on the development of a strong decision-making philosophy for each project. Although not always successful, an emphasis is placed on "appropriate intention" - that is, utilizing a value-based layering of the graphic analysis of existing conditions as the basic generator of the "intervention philosophy" - that decision-making framework for the project. You may remember that the principal emphasis of the preliminary course taught at the Bauhaus by Albers in the late '20s was the notion of achieving the maximum effect from the minimum effort - in this instance, concentrating on the inherent energy and practical possibilities of a given material. This notion of situation-implied intervention continues to be a valid decision-making technique - witness the recent success of Antoine Predock's design process that includes sensing "... the 'emanations'...
of a particular building site..."2 and recording these energies in a very emotional, graphic fashion. The basic decision-making process that I present to my students emphasizes the importance of this kind of analysis-based decision-making within a traditional creative decision-making process. As is typical of such processes, it begins with information gathering and includes analysis, synthesis, issue discovery, and value application to the development of the project's intervention philosophy, and then proceeds to use this philosophy as a "filter" through which each decision must pass. An analogy for the development of this decision-making philosophy is presented in class in the form of a reference to the students' individual development of a personal decision-making philosophy. It is easy for them to see how their personal values, or personal design, is the manifestation of the series of decisions that they made in their past, and that these decisions are typically made within a personal value set influenced by their historical and current "environment." Because I view my studio as a self-contained learning unit, I have a particular sequence of projects that build upon each other in a rather orderly fashion, from simple vocabulary and graphic exercises to a final "architectural" design, as illustrated in figure 1. The first portion of the semester is used to investigate proportion & scale, rhythm, balance, unity & contrast, transition, ordering systems, shade, color, texture and even basic materials. The last portion is dedicated to applying those principles in more comprehensive problem solving. The project I would like to share with you occurs at the mid-semester transition from principles to application.

The Ninja Problem

The challenge to design a combat practice environment for ninjutzu was first given in the spring of 1987. An Environment for Ninja was the first comprehensive three-dimensional design project given in the studio, and lasted four weeks. Although this project had very strong site and functional requirements, the emphasis in this problem was placed on developing a conceptually strong design that reflected the
client's philosophy. The intention was to select a client type with a strong philosophy that would significantly influence design concepts. The oriental ninja warrior was chosen because he was an exceptionally appropriate client for this project. Although most professors would be reluctant to present the ninjutsu lifestyle as a model for contemporary student life, the fanciful Ninja does serve as a real, culturally founded, conceptually strong subject that can be readily researched and that adheres to a philosophy that, in many ways, parallels principals of the design process itself.

Ninja History & Philosophy
The history of the development of ninjutsu is shrouded in mystery and legend, although the more reliable sources suggest that it began to take form in the Kii Peninsula of Japan, where fugitive military leaders took refuge after the political and military upheaval of China in 900 AD. Here in the Japanese forests, Chinese military tactics were blended with Oriental mysticism and were taught to Japanese followers as a unique system of universal harmony and mind-body unity. Over the years, ninjutsu developed into a highly effective system of espionage, to the point that, during the feudal period of the fourteenth to the seventeenth centuries, the ninja warrior became a highly paid mercenary that could, through his unique approach to combat, achieve the same results as a hundred traditional soldiers!

The ninjutsu philosophy was based on a perception of universal harmony - that all things were the result of other circumstances and that, as such, much could be accomplished by bringing one's life into harmony with the environment and using those natural forces to great advantage. Consequently, the ninja warrior was often considered "magical" in his abilities, when in fact, he had simply developed an acute sense of the existing environment - physically, mentally, and politically. What at first seemed to most to be a peculiar philosophy was more accurately an unconventional way of looking at circumstances. Thus, utilizing his unique perception and understanding of the forces of the universe, the ninja could effectively use the strengths and weaknesses of his opponents to his own advantage. Unfortunately, the ninja placed little value on the moral aspects of his combat techniques, concentrating instead on the ultimate goal of winning!

This philosophy of universal harmony and balance based many of its theories on the five ways that the elements of the world are manifested - the void, the wind, the fire, the water and the earth, and included nine levels of personal development - three physical levels, three mental levels, and three spiritual levels. This belief system controlled every aspect of the ninja's lifestyle, becoming a way of life, rather than simply a point of view. This strength of philosophy made the ninja surface as virtually the perfect design client!

The Problem Site
The students were given the attached program handout. They were asked to develop a combat environment for practicing the ancient art of ninjutsu. Although there was a maximum 32' cube boundary given for the site, only the 32' square base and the three-story three bay structural frame shown in Figure 2 were given as existing "context." The site was scaled to 3/8" = 1'-0", which built directly upon the 12" square we had been dealing with throughout the first portion of the semester. Since the
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foundation of the ninjutsu philosophy was harmony with the existing environment, it was anticipated that this existing context would suggest the beginning of an ordering system for the entire project, although it was constantly stressed that simply repeating this ordering structure was not a required response. The basic structure given in this problem imparts a sense of construction logic to the project and serves to introduce the students to the ordering potential of a structural frame.

The Problem Program
The ninja's physical abilities and his almost "magical" ability to appear and disappear allowed me to eliminate some of the less abstract functional considerations (such as stairs) and to replace them with two concentrated functional requirements - a swinging element and a sliding element. It was intended that a major portion of the combat environment would be designed to swing away from the initial construction and that another element of the original composition would be designed to slide away, consequently enabling the environment to be configured in four different ways. It was expected that the swing and the slide would significantly alter the original environment when enacted, so it was not required that the resulting composition be contained within the original 32' cube boundary. These two movements were selected as basic abstractions of two of the fundamental ninja unarmed combat movements: ju-taijutsu (grappling and throwing maneuvers) and daken-taijutsu (striking and kicking maneuvers) - and was intended to suggest an application of the ninja philosophy of gaining the most from every expenditure of energy. The potential for the students to use these two "simple" movements to dramatically change the character of the combat environment was intentionally included in the problem.

The design was to be presented in model form - corrugated cardboard preliminary models and painted balsawood and painted or laminated chipboard, wire and plastic final models were required.

The Design Process
The design problem began with the gathering of background information on the ninjutsu philosophy, the constraints of site, and the functional and theoretical aspects for the two required actions - swinging and sliding. I helped to firmly establish empathy for the client by quoting from one of the ninja resource books: "Ordinary townsfolk considered the ninja as social outcasts and warriors looked down upon them as traitorous cowards."

The students could immediately relate - the majority of their friends on campus regarded design students as "social outcasts" for their strange hours and peculiar interests, and in particular, their engineering
peers viewed them as unworthy participants in the building construction industry! As the students continued to analyze and break apart the information, the patterns of the ninja philosophy began to suggest some interesting parallels with the design process we had discussed. One reference quoted a comment by a contemporary ninja master that seemed to be aimed directly at the analysis the students were engaged in:

"You must clear your mind and being of preconceived impressions of the way things are. Many times there is a great difference between what we want to believe and what is real. We can be so caught up in what we want to see, that we are prevented from seeing what is really there."

The students could relate to the need to view the existing context with an open mind, and the intensity of their analysis was doubled. They understood the ninja's reliance on thoroughly knowing a situation by seeing it in an unconventional way, and as they began to synthesize the site, program and client analyses, they became more aware of how the client's philosophical strength could be reflected in the development of a conceptually strong decision-making philosophy for their designs. Class discussions of the ninja's disciplined life and combat techniques led naturally into discussions of the effect of order and unity on a design. The client's skill at accepting and using an enemy's power and energy against himself sparked discussions of how major existing patterns in the site and program can be taken advantage of by being utilized to generate significant conceptual ideas. The discovery of the client's belief in a universal harmony and the interrelatedness of events caused the studio to consider the interwoven nature of their design decisions, and to begin to seriously consider the harmony of "in" (dark) and "yo" (light) in their design composition. As the parallels between the ninjutsu philosophy and our design philosophy expanded, it became obvious that the similarities between the three levels of personal development (physical, mental and spiritual) and the three Vitruvian principles of design (firmness, commodity and delight) were more than accidental!

The results of this problem were encouraging. With freshman students in a short project, some problems with craftsmanship and incompleteness was to be expected. But the majority of the projects were actually very well prepared. Although the given context and structural emphasis caused a certain physical uniformity in the solutions, the conceptual ideas varied considerably. Some designers developed the client's mysterious character, creating a design that only revealed itself as it began to swing or slide. Other designers worked on simplicity and proportion - others chose to deceive the viewer by presenting a facade that changed dramatically as the movements were made. Most of the swings and slides broke the given cubic form into numerous sub-cubes, but a few took up the challenge of using the energy of the required motions to significantly change the nature of the original design. Order and unity were obvious themes, assisted by the typical extension of the given structure. A few designers were bold enough to experiment with contrasting their design with the given grid system. Texture was used to reinforce some of the conceptual ideas, although there is much more potential in this area. Color use was more successful - there was an overabundance of red, black and white, but many of the projects did go beyond this traditional color set to attempt metaphorical references to natural landscapes and to allude to an exchange or burst of energy. Almost every solution
submitted for this problem had some interesting characteristic that the student had investigated, prompted in part, I feel, by the unique philosophical strength of the ninja warrior!

The author of a book on the art of ninjutsu wrote what I feel would be the ultimate compliment for a design when he described the appearance of a ninja warrior in the throes of combat: "[He] doesn't look like a man in a fight: he simply moves as appropriate, his body a servant of the strength of his intensions." How wonderful it would be if our designs were so appropriate and intensional that they appeared to naturally fit the circumstances!

Conclusion

This project has been very successful for my studios, and I feel that it was its multilayered philosophical appropriateness that gave it a particularly noteworthy dimension for presentation at this conference. It seems that the selection of the ninja as a design client was a near stroke of genius - well reasoned, logical and appropriate! I would like to close with that thought, but I am compelled not to by a personal characteristic notably absent in the ninjutsu philosophy - honesty! Although I would like for you to leave believing that my selection of the ninja as a client was a well reasoned and intensional manifestation of the semester's goals, it didn't happen quite that way. Actually, only hours before I was to start a new project, I found myself on a desperate expedition to the nearest supermarket, frantically pursuing the toy aisle, hoping to find some sort of scale figures that would fit within the dimensions of a cube project I had in mind. I remember standing there on aisle 7 with a bag of plastic ninja figures in one hand and a bag of "hand painted" cowboys and Indians in the other. I had no idea what a "ninja" was, but I chose the ninja because, in a moment of Muzak-induced deja vu, subconscious drive-in-movie images of kung-fu action flashed into my mind. I can only guess where the alternative selection would have led my studio!

So there you have it - a design studio based on logic, analysis, appropriateness and intension was guided by the chance selection of those plastic ninja figures. Could it be that the unexplainable choice may ultimately result in appropriateness? Or was it that I, just like the ninja warrior, was simply so "in tune" with the universal energies that the proper selection was inevitable? I wonder if that hand painted Indian on my shelf knows the answer...

Notes

1  Wurttembergischer Kunstverein. 50 Years: Bauhaus - German Exhibition. Royal Academy of Arts (London) 1968, p.36.
5  Hayes, p. 135
6  ibid., p.68.
National Conference on the Beginning Design Student (5th: 1985, Albuquerque)

Offered through the Research Office for Novice Design Education, LSU, College of Art and Design, School of Architecture.
"Of all things I honor beginnings...I do not think the circumstantial play from year to year, from era to era, has anything to do with what is available to you...what was has always been, and what is has always been, and what will be has always been.... That is why it is good for the mind to go back to the beginning, because the beginning of any established activity is its most wonderful moment." (Louis I. Kahn)

From the beginning architects have continuously been involved with two realms of inquiry concerning architecture: 1.) architecture as related to an interpretation of man and his world or society, and 2.) architecture as related to itself and its constituent elements. Evidence of this continuing inquiry exists within the manifestoes produced by architects over the course of architecture's history, and the evidence is the writers' attempts to address, in some way, the ontological question "What is architecture versus something else?" - or, "What constitutes proper architecture?" (Rowe 1987). Consequently, it can be said that the primary intent of an architectural manifesto is to address and define the field of architecture, and to fill in the area of the field between the boundaries demarcated by the definition.

By addressing, defining and filling in the field of architecture a manifesto contains informative statements of values and priorities among the various architectonic concerns, and provides a realm of theoretical discourse that is a primary source for the perspectives that guide the choice of organizing principles and constraints. The thrust, therefore, of a manifesto is about the location of and the merit of norms to be valued and aspired towards in the practice of architectural design. This normative position presented by an architectural manifesto provides much of the basis for architectural design.

"Tradition is a continuous sequence of all innovations, and therefore the most reliable guide to the future. Tradition is like an arrow pointing to the future, never to the
past. Transmission is tradition's real meaning, its reality." (Le Corbusier)

"new architecture...has sprung from the strivings of idealistic individuals to make man's environment better" (Norberg-Schulz 1965, p. 19).

In developing the beginning course for beginning students of architecture at Louisiana Tech University the Department of Architecture sought an appropriate vehicle for developing awareness of the traditions, methods, and concerns of the discipline of architecture. The search for such a vehicle led to the consideration of the architectural manifesto because it has been and is a part of the architectural tradition from Vitruvius to Eisenman, it is a method of critical thinking, and it is an assessment of what architecture should or should not be concerned with at a given point in time. Since the Department of Architecture drives its upper level design studios through the establishment and investigation of an issue of some importance and pertinence it was this latter aspect of the architectural manifesto that made it appealing as a focus for the beginning course. Consequently, the beginning course was structured around the utilization of the architectural manifesto as the primary focus or vehicle for the development of awareness of the various concerns of the discipline in the beginning student.

The conceptual structure of the beginning course is derived from the constituent elements generally found in a manifesto of an variety. These constituent elements are: 1.) the locating and identifying of a problem or pertinent issue, 2.) an unfavorable assessment of the prevailing practice, 3.) the enumeration of untapped or latent opportunities, and 4.) a counterproposal with its rationale (Rowe 1987). The derived conceptual structure interpolates and groups the four constituent elements into three distinct course components. These three course components are 1.) the investigation of a particular historical period or epoch, 2.) the establishment of an architectural manifesto with its rationale and 3.) the utilization of the architectural manifesto in a design situation, or in more succinct terms - READING, WRITING, and ARCHITECTURE.

READING, the first component of the course, was subsequently organized, or thought of, in terms of three investigatory categories: the culture or society, the profession of architecture, and the output of the architectural profession. The intention of the component being the acquisition and development of knowledge and characteristics of an architectonic situation, and through analysis of the knowledge and characteristics an identification of a problem or pertinent issue, an assessment of the prevailing practice, and an enumeration of possible opportunities.

The second course component, WRITING, was viewed as a point of synthesis. A synthesis in terms of generating a counterproposal
and its rationale from the previous course component's activities. The counterproposal, or architectural manifesto, generated was intended to be either a doctrinaire position or a categorical system (Attoe 1978). The doctrinaire position asserting a singular point of view, attitude, and approach that is of primary, if not sole, importance to defining "proper" architecture; the categorical system possessing some external model that elaborates, connects, and sustains norms and categories for distinguishing what counts from what does not count as "proper" architecture. Le Corbusier's "Five Points" from Towards A New Architecture is an example of an architectural manifesto that takes a doctrinaire position, and Vitruvius' The Ten Books of Architecture is representative of an architectural manifesto that presents a categorical system. Also, the counterproposal was to be organized into two sections: orientation - the critical stance of the position, and devices - the prescriptive architectural devices (Rowe 1987). Le Corbusier's Towards A New Architecture provides an example of each section: orientation - "The house is a machine for living in." (Le Corbusier 1986, p. 107), and devices - pilotis, free facade, roof garden, free plan, and horizontal strip window (Le Corbusier 1986).

The final course component, ARCHITECTURE, was thought of as output, or the production of a physical manifestation, from the implementation of the prescriptive architectural devices on a given set of programmatic concerns. The intention being to establish an understanding, in the beginning student, of the role a normative position plays in the architectural design process.

"...the idea of architecture is transmitted through the universities." (Donlyn Lyndon)

The beginning student taking the beginning course in architecture at Louisiana Tech University, however, does not take the conceptual structure, but rather takes the actual course offering. At Louisiana Tech University that means taking the beginning course in the third quarter of the first year after two quarters of two - and three - dimensional composition, and concurrently with an architectural/technical drawing course.

The beginning course as it is currently offered begins with a series of assigned readings. The assigned readings are located in the the following books that are placed on "library use only" reserve in the Prescott Memorial Library: "Building Dwelling Thinking" in Martin Heidegger's Poetry, Language and Thought, chapters 1 - 3 in Christian Norberg-Schulz's Intentions in Architecture, and chapter 1 in Andrew Saint's The Image of the Architect. The intention of beginning the course with these readings to establish very early that the course involves the ontological question "What is architecture versus something else?", and to begin to investigate and think about the question. Each individual student in the class is responsible for all of the assigned readings, and in participating in the subsequent dialogue and discussion of the contents, meanings, and
This initial activity is then followed by the first of three READING components with this particular one involving Classical Architecture. Again, the assigned readings are located in books placed on "library use only" reserve, and the assigned readings are as follows: chapters 2 - 5 in Spiro Kostof's The Architect, chapter 2 in Andrew Saint's The Image of the Architect, Andrea Palladio's Four Books of Architecture, and chapters 1 - 6 in John Summerson's The Classical Language of Architecture. In this activity each student is assigned to read a particular individual chapter in one of the books, and to write a one page abstract on the chapter. Each student is then required to present the abstract to the entire class, and after presentation of all of the abstracts a class discussion is begun focusing on the profession of architecture and its output during this architectural period as it was presented in the assigned readings.

Upon completion of the assigned readings, presentation of the abstracts, and discussion each student in the class is required to conduct an analysis of each of two buildings, and in this particular instance they are Villa Rotunda and Villa "La Malcontenta". The analyses are done on tracing paper in a freehand technique using photocopies of plan, elevation, and section of each building. The analysis of each building focuses on the massing, space definition, structure, entrance, fenestration, and circulation.

After finishing the analyses, each student is assigned the task of WRITING the first of three architectural manifestos dealing with a particular architectural period, and in this instance that means writing an architectural manifesto as if the student were a practicing architect in the historical period that produced Classical Architecture. It is expected that in writing the manifesto each student will rely on the presented abstracts, the completed analyses, and additional self-motivated research to form the ground upon which manifesto's counterproposal is built. A preliminary or draft manifesto is initially written and submitted for comment and criticism, and upon its return it is reworked and then finally submitted in a maximum of three typewritten pages accompanied by a bibliography.

Concurrently with the reworking of the preliminary architectural manifesto each student is given a brief program statement for an observatory:

**OBSERVATORY** - 1. A place or building set apart and fitted up for making observations of natural phenomena; 2. A place or structure for affording an extensive view. SYN: observation post, lookout, outlook, watch tower, tower, beacon, lighthouse, pharos, gazebo, belvedere.

Each student will design an observatory.
and the instructions for assembling or constructing a given architectonic kit of parts containing beams, columns, floors, thin walls (partitions), thick walls (bearing walls), fenestrations, stairs and ramps. At this point the third and final course component, ARCHITECTURE, begins for the first of three times.

Each student now begins to design the observatory using the preliminary architectural manifesto and the program statement as points of departure for the design journey. The design journey is modelled along the lines of the Beaux - Arts program, and consists of three phases: esquisse, study, and project rendu. The esquisse is the first phase required to be completed by the student designing the observatory, and is completed in a single five - hour class period without the benefit of critique by the course instructor. The esquisse is done on tracing paper in either a hard - line or freehand technique to scale and requires the generation of a parti diagram, plan, elevation, and section. The finished esquisses are submitted to and reviewed by the course instructor to insure utilization of the student's preliminary architectural manifesto and compliance with the rules governing the use of the individual parts from the architectonic kit o parts. The esquisses are returned at the start of the next class period, and the second phase of the journey begins - the study.

The study involves the course instructor and the student discussing the various criticisms and comments they both may have about the esquisse. Its focus is on development and refinement of the esquisse, and on the realization of the intentions contained within the preliminary architectural manifesto. The product of the study is a pile of tracing paper reflecting attempts to resolve or reconcile the various conflicts between ideology, form, context, and operation.

The final phase of the journey, the project rendu, involves the communication of the completed design of the observatory. The communication package consists of the finished, reworked architectural manifesto, a model, and a sheet of drawings, and in this instance, Classical Architecture, the drawings are plan, elevation and section done in ink on drafting film.

Upon completion of the project rendu a critique or review session is held utilizing peer criticism. Each student presents both his or her architectural manifesto and project rendu to the class, and criticism based on the presented architectural manifesto is solicited from the class. The course instructor's evaluation of the project rendu is also based on the relationship between the architectural manifesto and the produced object, and is focused on the theoretical development, formal development, and
After critique and evaluation this particular design journey is finished, and the student begins a second trip through the three course components. This trip is oriented to Modern Architecture, and begins with reading the following: chapters 8 and 9 in Spiro Kostof's *The Architect*, chapter 6 in Andrew Saint's *The Image of the Architect*, chapters 1 - 12 and 14 in Le Corbusier's *Towards A New Architecture*, and chapters 1 - 7 in Bruno Zevi's *The Modern Language of Architecture*. It continues with the writing of abstracts, presentation of the abstracts, discussion, analyses of Villa Savoye and Villa Stein - De Monzie, writing of a preliminary architectural manifesto, esquisse, study, and project rendu. The project rendu, however, this time is altered, and the plan, elevation and section drawings are replaced by a single one - point perspective drawing done in ink on drafting film.

Upon completion and evaluation of the project rendu for Modern Architecture the student begins the final trip through the course components this time focusing on Post - Modern Architecture. The assigned readings are: chapter 7 in Andrew Saint's *The Image of the Architect*, chapters 1 - 10 in Robert Venturi's *Complexity and Contradiction in Architecture*, and chapters 1 - 16 in Charles Jencks' *The Language of Post - Modern Architecture*. The analyses are of the Venturi House and Texas House 7 by John Hejduk, and the project rendu is again altered to include an axonometric drawing done in ink on drafting film rather than orthographic or perspective drawings.

The beginning student having completed three trips through the course components is then assigned one final activity. This final activity is intended to pull together the accumulated knowledge and demonstrate a developed awareness of the traditions, methods, and concerns of the discipline of architecture through the writing of a personal architectural manifesto for today.

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5th NATIONAL CONFERENCE on the BEGINNING DESIGN STUDENT
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April 8 & 9, 1988

National Conference on the Beginning Design Student 5th, 1988, Albuquerque
CHESS PIECE - A STORY OF TWO CITIES

INTRODUCTION

PROBLEM

METHOD / PROCESS

OUTCOME

THE CHESS SET

YUNG HO CHANG & DR DANIEL DOZ
ASSISTANT PROFESSORS OF ARCHITECTURE
DEPARTMENT OF ARCHITECTURE - BALL STATE UNIVERSITY
MUNCIE, INDIANA 47306
INTRODUCTION:

2:50 PM, Tuesday February 2, 1988:
The Queen made her final move: From the edge of the site, she flashed through space...

3:00 PM:
The game was over. On the field, a small group remained victorious: All in architectural images.

This was not merely a game of chess but also a review of a project, which was conducted in our second year design studios during the Winter Quarter 1987-88.

An architectural design project embraced the idea of a chess game.
Through the project, a group of fundamental architectural issues were stressed:
- Developing design process and extending inspirational resources beyond the limit of architectural concepts.
- Expressing through architectural language the various qualities of a specific place, such as function, atmosphere, spirit and so on...
- Considering a basic component of architecture: Time.
- Experiencing different working relationships, from individual work (the "piece") to team work (the chess set).
BEGINNING OF THE GAME:

PROBLEM:

"A chess game depends upon 3 factors; Matter (represented by the 32 pieces), Space (represented by the 64 squares), Time (represented by the moves)"

Xavier Tarkover

To design a wooden chess set using architectural images. The white pieces representing the city of the day and the black ones, representing the city of the night.

Each chess piece is randomly assigned to students.

GROUP 1

WHITE
CITY OF THE DAY

PAWN (8):
ROOK (2):
BISHOP (2):
KNIGHT (2):
QUEEN :
KING :

TOWNHOUSE
BANK WITH OFFICES
CHURCH
CAFE
JUDICIAL COURT
CITY HALL

GROUP 2

BLACK
CITY OF THE NIGHT

TOWNHOUSE
DEPARTMENT STORE / CASINO
FIRE STATION / PRISON
NIGHT CLUB
OPERA HOUSE
CITY HALL

The volume of each piece is specified according to its value in the game, with Pawn being the smallest and King the largest.

Each piece must be designed within the envelope and touch all six boundaries.

Recommended reading:
BRUNNER, John: The Squares of the City
CALVINO, Italo: The Invisible Cities
ROBBE GRILLET, Alain: Topology of a Phantom City
II MIDDLE OF THE GAME:

METHOD:

a. Developing Design process and extending inspirational resources:

It is essential that students, at the beginning level, be confronted with different design processes, in order for them to be able to choose the most appropriate one for a given problem. The chess game acts as a rather abstract exercise, for which students have to consider a non-programmatic notion as a generator of the design. It is also crucial at this level that students start to realize that architectural design takes its inspiration from a broad range of resources, that it does not necessarily come from previous architectural realizations. This project is structured not only to advise students to obtain ideas from chess game, but also to encourage them to learn from any subject matters or fields. We believe this approach will enable them, therefore to be more creative and not to mimic what has been done. It leads to the fact that they need to develop at this stage of architectural education their own ideas and processes that will suit their individual concerns and interests.

b. Expressing various qualities of a specific place through architectural language:

A specific place contains several layers of definition. It is important that students understand that what makes a place is an interconnection of factors (function, atmosphere, spirit...) that all have an important part to play. Thus, each factor can become a component of the total architectural imagery through deliberate formal articulations. For instance, to generate a particular atmosphere by manipulating spatial sequence and/or light. Furthermore, students need to be able to make a distinction between their personal input in a design and the given program, in order to a better understanding on how do they may design.
c. Integrating the fourth dimension - Time as a basic component of Architecture:

Our perception of space is only possible when motion is involved. This motion exists only through time (the 4th dimension) and it acts on several aspects here:

The first one is that the life of a building. It starts to exist when it is completed. The building goes to evolve through several stages. Time marks the building through the effect of the weather, the effect of the inhabitants, how they appropriate a space. On one hand, this understanding may lead new design notions, such as "weathered architecture" and "Narrative Architecture". On the other hand, it makes the student realize the limit of the control they exercise on their project versus its actual realization. They can hardly control the public appropriation. But what is important here is to realize this factor and to create room for letting it happen. They need to understand that this freedom they give to the 'public' is essential, but without jeopardizing their own design.

The second level is that, perception of architecture with motion through time, defines the most important characteristic of architecture; Space. It is space that contains the 'atmosphere'. That motion implies also essential issues which are related to human scale, perception, activities, etc... Architecture (so far) is designed for people, and a project should always remember, or take that factor into consideration as a main programmatic component.

d. Experiencing different working relationships:

There are several levels of working relationship between students in this project.
- Individual work: The chess piece
- Team work: The 2 cities
- Team work: Complete chess set

This aspect is also significant in the sense that students must be aware of the different steps involved in a working process, from the individual component—a piece to the chess set as a whole. And also that team work brings more motivation and is an important learning experience.

There are two folds here:
The idea, which comes from an individual. The refinement of the idea, where the team can be much help to the individual. We notice that students at this level of study have a difficulty to take some distance from his/her project, they dive so deeply into it that they, sometimes, lose their sensibility for making judgements. Team work helps this situation as a counter balance.
OUTCOME

The game:
Each time we would move a piece for the first time, the author of that piece had to present his/her project and a discussion followed.

The project:
It was extremely well responded by the students, the high quality of the finished chess set demonstrates not only their great enthusiasm, but also the fine effort and struggle they went through, during the quarter. Here are some students written comments that we thought were typical of their reaction:

-There was so much to think about the chess piece - so many solutions to various problems...
-Broader understanding of the effects of architecture...
-My effort was probably the best I’ve have had so far,...
-This quarter, I feel like I’ve learned alot about the feeling(s) of (a) space(s) and how you progress through spaces.
-Reality limits the design vocabulary.
-I learned how to deal with texture...
-This quarter of studio was the most successful design I completed during this last two years.
-... but come to a better understanding as to the emotional qualities of a space.
-I learned that architecture can be thought of as a stage setting where each detail must pertain to the story or else it should not be there.
-My own personal research has been the basis for my learning.
-I really enjoyed the project, really pushed me to be innovative.
-The project was so interesting and fun that in itself made the quarter worthwhile...
-The chess piece project was a bit too long...
-My creative thinking skills were constantly being challenge...
-The merging of studios was a good idea i think.
This project offered us, architecture design professors, a few observations:
Since both sides dealt with the same material for the finished pieces, there was not a clear distinction between the city of the day and the city of the night. For example, it would have been preferable that the city of the night, in this case used a dark varnish (mat), therefore creating the distinction and keeping the homogeneous nature of a set.

One of the teaching goals we assigned to ourselves was for the student to develop design initiatives. This was only partly successful. The way we used was to reduce individual desk crits and to promote group discussion and crits. But at this level, students needed a lot of individual crits, specially at the beginning of the project, and we saw this lack often expressed in their final comments.

Some positive aspects were that we felt, from the products and the students' comments that the design process, which was our main goal, had been greatly improved through the students' works. Also, the use of wood (bass) for the final model, brought to the student a certain pride as well as more refined craftsmanship into their pieces.

But overall, this project carried so much enthusiasm from the students of our respective studios and from students from upper years, that this demonstrates how, in those conditions, students are willing, by themselves, to work harder than usual.
Participants are:

City of the day
Dr Daniel Doz
Lisa Campbell
Lori Farlow
Kelvin Haywood
Mindy Homan
Jon Keiser
Mike Kinstler
Bill Konstantakis
Beth Krege
Michael Losasso
Kirt Neal
Eric Ratts
Steven Richardson
Phil Stinson
Mark Webber
Chris Wright

City of the night
Yung Ho Chang
Rustin Becker
Carol Conway
Brian Danyi
Kelly John Good
Lynne Haines
Barbara Hayworth
Leslie Jud
Andy McCleary
Troy Michell
Michael Niccum
Todd Oakley
Rick Renschen
Todd Rinehart
Tim Siefker
Bruce Worthington

Thank you to our 5th year students for their constructive help:
Andy Hines
Cory Hunnicut
Susan Hickey

It was a good quarter, never thought I'd make it
(an anonymous student's comment)
National Conference on the Beginning Design Student (5th: 1985; Albuquerque)

Offered through the Research Office for Novice Design Education, LSU, College of Art and Design, School of Architecture.

APRIL 8 & 9, 1988
FORM AND IMAGINATION

A natural result of the barrage of information in this century has been the narrowing focus or superspecialization of most professional fields. Clearly no one person can be an expert in all areas. At the same time a broadly based humanistic approach to education confers the ability to control technology not be controlled or limited by it. At Texas A&M, we have designed a new course that, we think, helps provide architectural designers with precisely that ability. "Form and Imagination" fuses a beginning design studio and an interdisciplinary seminar in art and architectural history, literature and music. It was conceived as a way to counteract the frequently limited humanities backgrounds of entering freshmen design students, and combat the propensity for design students to focus on design work to the exclusion of other creative disciplines. "Form and Imagination" is an attempt to widen/expand the vision of design students, and to hone their decision-making, technical, and communication skills. The course is ideally suited to first-year students. It is at the freshman level that lifelong design and problem-solving attitudes are shaped. The potential of "Form and Imagination", however, extends far beyond the freshman class. Habits learned at the beginning of one's professional career remain with a person forever. Ideally, they will be excited designers and students for the rest of their lives.

The structure of "Form and Imagination" is predicated upon a series of interlocking principles and goals. First, design is not limited to the visual media; all creative disciplines share certain
decision-making processes. Our primary goal is to illustrate these commonalities and demonstrate their practical application for architectural designers. Second, process is as important as the product. A person must understand how and why decisions are being made. "Form and Imagination" students learn through continual group and individual critiques to analyze their decisions intelligently and lucidly. Third, the broader the framework in which designers make decisions, the more sophisticated those decisions will be. "Form and Imagination" stresses the importance of art and architectural history, music and literature as resources for the designer, and underlines the complexity of the process by which ideas are transformed into images. Fourth, intellectual curiosity should be cultivated at a time when it can be of maximum benefit to students—not in a senior "cap-stone" course, but at the beginning when they have not been locked into a rigid framework. Fifth, architects should be verbally as well as visually articulate; the most influential designers have always been those who have been able to explain both the practical and the philosophical reasons governing their design decisions. "Form and Imagination" students must write; they keep a "common place book" in which they are asked to document their thought processes in written and visual form. Sixth, a balance between the individual as an independent entity and the individual as part of a greater whole is essential, in the same way that each individual design decision is a part of a whole. We stress that the individual's participation within the group is as important as his or her individual work. "Form and Imagination" challenges the students to recognize their own capabilities, their own strengths and weaknesses, as designers and
people. Finally, well-developed technical skills are an essential complement to intuition. Designers must have the technical skill to communicate visually and verbally. A picture is not necessarily worth a thousand words.

We have discovered that collaboration, the bringing together of multiple disciplines and methods in the design studio, is a most effective and intellectually stimulating way of achieving these goals. This network of collaborations and explorations of the individual psyche is necessarily an intellectually intense, multidimensional structure. Language and literature, art and architectural history illuminate one another. Coordinating thoughts technique and ideas, the combination has proven to be flexible. The inspiration that Maurice Sendak draws from Mozart, that the pre-Raphaelite poets and artists drew from Raphael and his predecessors, Gertrude Stein's associations with the Cubists, all bear witness to the importance of cross-influences linking the arts. Students today seem particularly in need of this exposure: the two-dimensional television screen is often their primary visual and all too frequently their primary intellectual experience.

In our course, an architectural historian, a designer, and an English professor collaborate actively, simultaneously, in the design studio. The methods of one become the methods of the others. We stress the commonalities of the design process, not the uniqueness of architectural design. We order our design problems in such a way that constraints become challenges. Our program prepares students to be
active participants in true collaborative efforts when they emerge from the studio. And, by including art and architectural history, literature and music as sources of inspiration and technical skill, we provide a broad range of material for the student to draw upon as a designer and as an individual throughout his or her life.

Each student begins the semester by writing an autobiographical paragraph and selecting, in collaboration with the professors and the class, a word describing his or her own personality. The word must then be expressed in a sequence of design exercises, each project conveying visually the word's meaning, introducing new formal problems and technical skills, and incorporating a new medium. Each student's word acts as a design vehicle, a thread linking all the problems, but because it reflects the individual personality of each student, it is also a truly effective means of enhancing the student's awareness of his or her individual strengths and weaknesses. Without self-awareness, students cannot assess their potential contribution to the collaborative effort. Students are unlikely to discover the part they might play in the whole, unless they understand themselves first as individuals. The student's interaction with the group and his or her environment is comparable with the connection between individual design decisions and the total composition, between the individual word and the entire poem, or between the single instrument and the orchestra as a whole. One of the strengths of our model is that we have achieved an elegant balance between individuality and collaboration. While we emphasize collaboration, we also stress individuality and self-awareness.
Because the word is essential to the process, it must be selected with care. That care starts at the beginning when the paragraphs are shuffled and read aloud by different members of the class. Reading the paragraphs aloud to the class, we have discovered, helps to break down the barriers between individuals. Initially, each student suggests three words that might describe their personality. But the entire class participates in the final selection process and must concur in the final choice of words. Before the end of the first week, the students meet with us individually to discuss the nature of their words, nuances of meaning, and whether it can be portrayed visually. Words sometimes shift to reflect these nuances — of meaning and personality. Fluid became streamlined, for instance, agonized became intense. It is at that time that we preliminarily suggest works of art and architecture, artists, architects, particular historical periods, music, composers, musical instruments, writings and writers to which they might turn for inspiration. "Muted," for instance, calls to mind Corot, Whistler, Debussy and some impressionists. "Buoyant" could be Gershwin, Sousa and Renoir — it's not going to be Ensor, Wagner or Thomas Hardy. The historian sends the students, as an initial step, to the library to look in suggested areas for images that they would use their words to describe, suggesting that they be particularly aware of things like line, color, texture, light, shapes, forms and viewpoint. The English professor provides them with writings and writers to investigate. This initial encounter with literary, musical, and artistic works tests the accuracy of the word selection. A student who does not react positively to the works suggested is not likely to have a truly autobiographical word. In the past, such mismatched students
have experienced great difficulty in defining and solving the semester's design problems. For this reason, strong efforts are made to connect each student with the most appropriate word. Their word is the means by which the student interprets each design problem.

The selection of problems is constantly evolving as the course is refined. As we work together and with the students we constantly evaluate the process to determine what works and what might be done differently or more effectively. At present, four projects form the core of the semester's work: a figure-ground study, a three-dimensional study of negative and positive space, a conceptual interpretation of three-dimensional space, and a living environment designed for a specific client and site. Each problem is presented orally, and with the active participation of all three professors. Each student writes his or her own version of the problem in a commonplace book. We have discovered that this mode of presentation requires each student to listen carefully, and to confront and define the problem individually. All students face the same constraints, use the same "building materials" for each project, yet discover that their personal interpretation, guided by their word, generates radically different design solutions.

The professors provide examples in literature, music, art, and architecture that illustrate ways in which the student's word might be given form in his or her projects. The English professor discusses the definition, history and the sound of the word; she analyzes the way in which different authors have created the effect of the word. The
architectural historian discusses the ways in which it has been conveyed visually by different artists and architects working in different historical periods. Students are expected to bring images, literary works and music to class, and to discuss what they have learned from them that might be applied to their design problems.

The first and most highly structured project is a two-dimensional, figure-ground visual construction using black ink, mechanical drawing pen, and white, three-hundred weight cold-press Crescent board. These constitute the material "budget" for the first problem. Experience has indicated that students achieve especially good results using these materials, and by using them, are forced to develop specific technical skills. They are asked to negate the traditional figure-ground relationship in which figure is dominant and background secondary, and to equalize the visual balance of the black and white shapes. What surrounds a shape is as important as the shape itself. The composition must not have a focal point, and the eye must move from the border of the board into and throughout the composition in a way that reflects the word of each individual student. Each design decision, however small, affects the whole. This is our student's first experience with thinking "in totality." Many of the questions that students will face in any design process are already present in this problem.

Two images constitute the visual "budget" for the first project: any parts of a diamond within a square or a circle within a square. These images must be arranged on a grid in such a way that the resulting composition reflects each student's word. The grid is based
on increments of an inch and the student may use any of these increments. The students must use parts of each of the images, change scale, and repeat the images without becoming monotonous. The grid is at once an aid to design and a stimulating challenge to design. Without the grid, beginning students might have difficulty unifying the composition. The grid helps them change scale. Changing scale prevents compositional lines and forces the student to realize the interrelationships between decisions. They must "think in totality". They must learn to shift vertically and horizontally to disguise the existence of the grid. The presence of the grid, therefore, also acts as a constraint, a challenge to the design process. It is the structure that guides each composition, but which must be visually obscured. Despite the fact that each student works with the same material and visual "budgets" and within the same constraints, each composition is totally individual. Each student is an individual, each student has his or her own individual word, and each student's interpretation of the problem is guided by that word.

The culmination of the semester's work is the creation of a living environment. It is at once the least structured and the most challenging project, applying abstract principles to practical uses. Students draw upon what they have learned about figure-ground, negative space, positive form, controlled viewpoint, illusion, and light. They draw upon what they have learned about the impact of individual design decisions on the whole. And what they have learned about themselves, through their word, must now be reconciled with the needs and personality of a particular client and the demands of a
particular site and environment. Here our stress on individuality and collaboration throughout the course is most rigorously tested. The student must display sensitivity to the needs of a client without betraying his or her integrity as a designer. We give them special objects and persons for whom they must design. We give them a site, and ask that they work with the earth as well as the building, stressing the connections that exist between the building and the earth. We talk about ways that spaces can be defined, pointing out that there are ways other than by using walls. We talk about windows and the function of windows. We discuss philosophical issues concerning house and home, and the values reflected in contemporary suburban housing, or urban corporate structures. We discuss practical matters such as site planning, drainage, sun angles, and vegetation. We talk about the importance of texture, materials, and light in creating an environment. We talk about shaping the land, approach, and entry. Each student must produce, a three-dimensional site model, developed as an exterior environment that reinforces the living environment. Each student must also produce, simultaneously, a model of his or her structure.

Assessment of student work is constant and multidimensional. We insist on high quality work. Students are graded on technical skill, innovation, participation, improvement, and their ability to go beyond mere definition of the problem. The student learns to assess his or her own work and that of other members of the class; every class meeting includes constructive, detailed criticism of preliminary or final projects. This constant exchange of ideas helps the student to
develop a positive attitude towards criticism. The process of assessment also requires students to explain their own design decisions; they thus become accustomed to communicating verbally as well as visually. All three instructors assess each student's work collaboratively, taking into account the student's development from the beginning of the course, as well as his or her success in completing each formal problem, communicating the word visually, and his or her mastery of technical skills. The process is as important as the product.

We believe that "Form and Imagination" is an effective introduction to architectural education. We also believe that our methods can serve as a model for more advanced design courses, professional seminars, and teaching in disciplines other than architecture. "Form and Imagination" holds particular promise as an introduction to architecture for advanced students entering architecture from other disciplines. The course's interdisciplinary approach may be particularly effective for such students because it explicitly emphasizes the importance of design in other disciplines where a traditional design studio approach might not. In fact, we are shaping an attitude in our students -- towards design, towards professional activity, towards education, towards life -- actively nurturing a breadth of outlook - all by example. Our hope is to provide them with unexpected sources of inspiration and excitement, centered around their individual personality traits and concerns, that will lead them to explore further. We invite them to explore the past, the present and, in themselves, to find the future.
National Conference on the Beginning Design Student (5th : 1985, Albuquerque)

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Offered through the Research Office for Novice Design Education, LSU, College of Art and Design, School of Architecture.

APRIL 8 & 9, 1988
NEW CAR SHOWROOM:
An Introductory Building Subsystems Integration Project
Kevin Forseth

Introduction

Arch 400 is the first in a sequence of three core design studios in the Level II undergraduate studio sequence here at the University of Wisconsin-Milwaukee. After several years of gradual change in course content, the studio instructors for this course met last January and decided to radically shift the emphasis of the studio's primary design problem. It was felt that course content had drifted into a sort of stage set design mentality which resulted in our having slowly lost touch with the practical aspects of building design. We realized that to switch the focus of the studio away from the formal conceptual and toward the integrative physical aspects of building design was risky because we would not be able to discuss in depth any of the aesthetic issues that were of primary concern in previous studio projects. Nonetheless, we decided to gamble that students were capable of integrating much more than they would have believed possible at such an early stage in their development.

Some of the inspiration for changing the emphasis of our approach to the teaching the 400 studio can be attributed to the success of our Level I design sequence. In this regard, a brief summary of the content of our undergraduate design program and the Arch 400 studio would be useful.

About Our Undergraduate Design Studios:

Design studios in the undergraduate curriculum here at UWM are divided into two levels. Level one, for Freshman and Sophomores, consists of two required three-credit design studios. In these studios, students learn basic design and drawing conventions as they design small buildings with simple programs. The purpose of this approach is to integrate the teaching of graphics and basic design with the design process. The integration has worked so well that our school does not offer separate graphics or basic design classes.

Level II, for our Juniors and Seniors, consists of three four-credit design studios that are sequenced according to physical scale. Arch 400, the first in the sequence of our Level II design studios, is primarily concerned with interiors. Arch 401 addresses problems at normal building scale and Arch 402 is concerned with urban scale issues. In recent years, Arch 400 has expanded its scope to include small buildings that stand alone in the landscape.

About Arch 400:

The Arch 400 Studio typically offers three design projects each semester. The first design project is short in duration and conceptual in content, an interiors project lasting three to four weeks. The second project is usually the studio's major design undertaking and typically runs for a period of six weeks. The final project is often a design competition which is run for the benefit of a client from somewhere in the Milwaukee area. The New Car Showroom project described on the following pages was developed as a middle project.
The New Car Showroom Project

Students were given six weeks to design facilities for a New Car Showroom. The site for the showroom and final presentation requirements were provided. The site was located between a car wash and a vacant lot on a commercial strip development on the near north side of Milwaukee. All other aspects of the problem, including program, structure, materials, number of cars, parking, were to be group researched. On the basis of this research, every student was required to design a New Car Dealership around the automobile of their choice.

Problem Intent:

There were several reasons for developing the New Car Showroom as an integrative building systems project.

We were looking for new ways to get the students intensely involved in the design process. It was observed that only some of our beginning design students were interested in architectural theories and only some were interested in human behavior, but virtually all believed that knowledge of structural, mechanical and construction was very important to their education. We therefore reasoned that if a studio project focused on the physical aspects building design, student motivation for working hard on a project would be built into the problem.

We wanted our students to have a better grasp of the fundamentals of building construction in order to prepare them for Arch 401. We looked forward to formal expression with an understanding of the implications of built form. We were eager to see a building facade in which a window looked like a window and not just a hole punched in the wall.

We wanted a building type that would include a parking lot. Over the past few years, our design studios have neglected the role of the automobile as it relates to building design. We wanted this problem to address this real world concern.

We wanted to design an isolated building on a site; one that would not be heavily influenced by surrounding context. This would simplify the design problem because we would not have to deal with complex and subtle influences of surrounding building imagery. We considered developing programs for other types of strip development projects, including gas stations, car washes, franchise restaurants, and budget motels. The new car showroom was chosen for its scale and diversity of function.

We wanted the students to experience structural design in the context of a typical design problem without having to consider structural analysis. The structure for the New Car Showroom could easily be solved with conventional building systems of the type found in Sweets Catalogues.

We wanted students to develop an awareness of the importance of grasping mechanical subsystems. In our cold climate, these systems are an expensive item. For information regarding the sizing and design of HVAC systems, we would bring in a specialist.
We wanted the students to gain an appreciation for the art of detailing. In this regard, working with wall sections was deemed inadequate because in the past students often merely traced details out of books. Paraline drawings of major building corners were deemed a useful way to get students to think about the way that their buildings actually went together.

With so many factors to consider, we did not want to overwhelm the students with a complicated program. On the other hand, we did not want the program to be too simple. The New Car Showroom's program divided into clear public and service functions, which made it reasonable to diagram and easy to discuss in terms of the built form implications of designing public versus service functions.

We wanted to develop a single-story building. This would eliminate the need to design stair detailing and meet certain fire code requirements.

We did not want the students to design a building in which the issue of structure could be resolved by embedding it between floor and ceiling surfaces or the issue of mechanical subsystems could be neatly resolved by simply setting aside a room somewhere in the corner of the building. We wanted the integration of various subsystems to be an unavoidable part of the visual expression of at least one space in the building type. With the New Car Showroom, it was not a reasonable alternative to simply label a corner room "Mechanical"; ductwork, emanating from rooftop units, had to pass through or below trusses in the service area.

We wanted a design program that would encourage a heterogeneous structural and construction response so that we could discuss open kit-of-parts construction and off-the shelf building parts and subsystems.

Finally, to insure a measure of success in the project, we required ink on mylar presentation drawings.

Project Schedule:

The project lasted six weeks.

During the first week, students worked in teams. Each team was responsible for collecting information on a general topic. Teams of three to four people documented research under the following general topics: 1) Building type: team members went on field visits and conducted literature searches, 2) Design precedent: team members researched the significant works of well-known architects and period styles, and 3) Construction and technology: team members gathered information on structural, mechanical and construction systems and details.

After the first week, students worked independently:
2nd week: Students developed and presented alternative preliminary ideas.
3rd week: The most promising preliminary ideas were developed.
4th week: Structural systems were developed and integrated.
5th week: Construction paraline of a corner of the building was developed. Some site development was also accomplished.
6th week: Ink on mylar presentation drawings were completed.
Selected Student Design Solutions: A Contrast in Design Approaches

After final reviews, we assessed the strengths and weaknesses of the design project. One positive outcome of the project: Students were generally motivated to solve the problem in one of two ways: On the one hand, many students chose to solve the problem functionally, to build it simply and build it well. On the other, several students chose to emphasize the problem's aesthetic potential. In the end, it seemed design quality could be achieved regardless of the design approach. This had not always been the case in previous semesters.

Jeff Musson: Building Simply and Building Well* (see attached)
Jeff's project was the most thoroughly researched of all the designs in the class. His work reflects the careful and practical bringing together of many different concerns. Due to the inherent complexity of the program, the strength of his straightforward approach to design synthesis can be fully appreciated alongside the more dazzling approach taken by Dan Stube. In this regard, the design problem was especially valuable, for it enabled students with strong practical design abilities to compete with those having strong design talents.

Dan Stube: Designing for Aesthetic Considerations (see attached)
Dan chose to design a Jaguar dealership. Because these cars are frequently in need of tune-ups and maintenance, Dan felt it appropriate to play up the dealership's wonderful service facilities. His design, arranged hierarchically around a strong center core that dissolves into less rigid geometries toward the far boundaries of the site, features a tower at the entry that is in the shape of a piston. Housed in the piston is, appropriately enough, the parts department. Upon entering the facility, the customer's field of vision is split by a wall. To the left of the wall are located the service facilities; to the right, the new car showroom.

The individual pieces of the building, each housing separate functions, were arranged as fragments around the central core. Each fragment suggested in outward appearance a sense of its internal function. The building's structural systems, systems integration and detailing were straightforward yet varied.

The Successes and Failures of the Problem:

1. Successes:

The good students were able to integrate all phases of the project into a coherent building form. This we believe is demonstrated by the quality of the examples provided.

The required paraline drawings of building subsystems and details forced students to think about the true physical nature of wall and roof composition. Paralines were much more valuable as learning tools than wall sections, which students in the past tended to trace out of books on the night before projects were due.

*The phrase "Building simply and building well" was coined by David Buege, a visiting member of the faculty at our school three years ago.
2. Failures:

The project focused on building structure. Every project for the most part became an expression of architecture in which structure dominated. Because the project focused on the physical aspects of building, little time could be devoted to the development of abstract design concerns.

Students with drafting experience in real-world strip development projects found it difficult to overcome rigid design preconceptions.

Weak students struggled through every phase of the project. The project demanded a considerable amount of teaching time. Virtually everything was new to the students. Some things were even new to the instructors.

Summary:

The project achieved the objectives that we had set out in the beginning. In light of the fact that the students had not yet taken structures, mechanical or construction courses, they were able to synthesize much more than they could have imagined. The project's one pleasant surprise concerned the emergence of a new kind of quality designer: the student choosing to build simply and build well. In the past, the work of the practical designer was often overshadowed by the work of the aesthetic designer. This project was sufficiently complex to provide an opportunity for strong practical design abilities to be appreciated.

The project was well worth the time and effort. Everybody worked. Everybody learned. We intend to use this project again in the future.
Jeff Musson: Building Simply and Building Well
Dan Stube: Designing for Aesthetic Considerations

Site Plan

Section

Plan

Axonometric