The outcome of an architectural project is always contingent, dependent upon conditions or events that are not established at the outset. A university design studio does not easily replicate the state of flux which occurs as an architectural commission proceeds. In developing an architectural project, each new situation, whether it be a building code issue, an engineering issue, or a client reaction, must be viewed as an opportunity to further refine and develop the design rather than a hindrance to the outcome. In the design studio I describe in this paper, students test processes which attempt to take advantage of contingent conditions, opening up the design solutions to new possibilities.

As a means to open up the design process to new possibilities, this studio introduces the computer as the primary tool for design exploration. Through the computer interface, the work speculates on the possibilities of synergism, defined as the actions of two or more substances or organisms to achieve an effect of which each is individually incapable. Three synergistic conditions are explored: that between the designer and the computer, that between the designer with computer and designers/previous works of art or architecture, and that between two or more designers working together with the computer. The lack of a predictable result, one that may be obvious or superficial, is a positive byproduct of the synergetic and contingent circumstances under which the designs are developed.

Designer and Computer

The objective of achieving synergism between the designer and the computer is pursued as students explore possibilities to generate design options with the computer which would not have been formed using other mediums. The studio, for third and fourth year undergraduate students, most of whom are learning CAD for the first time, establishes the computer as a point of departure in a search for ways to reconcile readings of program, the city, and works of architecture into rich and coherent design projects. The computer as a creative, transformational force is used to generate forms and options, which are interpreted as potential design strategies. Students, therefore, are not taught a right way to use computer software (designed primarily for the development of working drawings) but instead encouraged to explore the impact of computer actions in a more open-ended way. The learning process for the studio encourages the exploration of possibilities unique to the technology rather than using it to replicate methods appropriate to other tools. In Figure 1, a study from the first exercise of the semester, a student explores the potential for developing perception while learning the software program.

Designer, Computer, and Work of Architecture

The thesis of the studio is that the computer makes possible what philosopher Michel Foucault referred to as a common locus, a site where the syntax of otherwise unlike things can reside and be juxtaposed as equals. The computer is the medium that makes possible a synergism that occurs between the author of initial syntactic forms and the subsequent author/reader who reads and interprets the initial set of forms with an eye toward his or her own goals. The computer is the catalyst, helping to precipitate the process without being involved in or changed by the consequences, for the transformation of an initial order to a new order.
Figure 2 illustrates this spirit of exploration in a subsequent assignment, the documentation of a work of architecture and its transformation into another work (Figure 2). The new orders are inventions which help to explore the similarities and differences between the works. The step by step process encouraged by the use of computer software allows intermediate steps (in this case of a three dimensional model) to exist not only as rough sketches, but also as constructs of ideas, frozen in time.

Figure 2: Richard Meier’s House in Pound Ridge transformed to John Hejduk’s Bye House. Elements of the initial documented work are reinterpreted through the ordering system of the Bye House. (Mak)

The computer provides a unique site for relating systems of order that in other contexts would be incongruous. As a platform which allows for intersections to be recognized and developed, the computer both forces abstraction and supports juxtaposition, thereby facilitating the overlap of differing orders. Abstraction is facilitated and made fluid by the computer environment, which may

Figure 1: The transformation of a goblet design by Le Corbusier into a three dimensional model would not likely have been created without the computer. (Kennis Mak)
overlook issues of scale, gravity, and materiality. Architectural precedents may then become the DNA for the future development of schemes; transformations of formal order are adapted and grounded in a context and use. In Figure 3 syntactic relationships are explored between John Hejduk’s Bye House and Michelangelo’s Laurentian Library (Figure 3).

In Figure 4 a student used the formal order of John Hejduk’s Bye house, interpreted through his analysis and documentation of the work, to help develop the formal organization for the plaza for his final project (Figure 4).

Figure 4: Transformational study for the plaza of the Colburn School derived from Hejduk’s Bye House. (Bell, with Thomas R.C. Hartman, & Brian Miller)

Designer, Computer, and Designer

In this studio a third contingency is introduced: that of students working in groups to design the project. In a true design collaboration, a joint intellectual effort, the project is not predetermined. At each step along the way, invention and intervention from teammates alters the preconceived notions of where the individual author is going. The contingency of collaborative design more appropriately simulates likely interdisciplinary team approaches of architects. Instead of the Howard-Roark-as-single-author model, which is the norm in architecture programs, students collaborating on designs may be better prepared for a world where contributions from colleagues, engineers, clients, government agencies, contractors, and other sources can be seen as both limitation and opportunity.
Collaboration is a synergetic mode insisting upon reflection. Designers must defend their ideas and consider options with which they would otherwise not be confronted. The teams which had the most successful collaborations were those in which the participants were willing to both defend their own work and be critical of the work of their teammates. (One team of talented designers with an excellent start on their project reached a less than successful outcome because of their inability to edit one another’s work. A project that began as a clear set of ideas was lost as greater and greater articulation blocked the clarity of the initial scheme.)

The computer changes the dynamics of interface between designers. A design sketch made in the digital computer environment is less identifiable to an individual author than one drawn on a piece of paper. The digital sketch exists as an object, separate from its maker and capable of direct manipulation. Members of a team may be critical of the design object without feeling that they are directly criticizing the designer. Working with a computer model enables an easy comparison of options and, likewise, facilitates transformations of a series of design ideas. The computer enables the dynamics of design ideas to be translated fluidly. Figure 5 illustrates the approach of one team of designers: a program model by one student became a basis for the group design party (Figure 5).

Curriculum

The curriculum of this design studio is structured according to a sequence which begins with abstract studies and proceeds to more concrete considerations. The site for the project is in Downtown Los Angeles, adjacent to Arata Isozaki’s Museum of Contemporary Art and across the street from the construction site of Frank Gehry’s Walt Disney Concert Hall. The program consists of teaching and performance spaces for the R.D. Colburn School for the Performing Arts, an institution currently considering the site for a new facility. The general process the students pursue, whereby each constraint acting upon an architectural project is identified and studied as a force rather than a preconceived permutation, isolates points of contingency to stimulate design solutions which are greater than the sum of their parts.

1 - Forcing Abstraction - Documentation & Analysis: Computer techniques are explored as they support ideas discovered in works of art and architecture. Each student documents a two-dimensional goblet design by Le Corbusier, overlays a 9-square grid on it, and transforms the image in a series of steps to explore the capabilities of the software and the interface between the two orders. The student then translates the forms into a three-dimensional image which suggests a sequence of spaces. These exercises introduce students to Point Line 2D and 3D solids software, the primary programs used for the work of the studio, and to the transformational potential of the computer (Figure 6).
Figure 6: Goblet designs by Le Corbusier are documented and transformed. Students explore the potential of the computer software as a tool for developing perception while learning the program. (Brian Miller)

2 - Analysis of architectural precedents:
Each student documents a work of architecture as a three-dimensional computer model and then generates two-dimensional drawings which analyze, describe, and display its underlying systems of order. The organization of computer files as the work is documented becomes a tool for its critical evaluation (Figure 7).

Figure 7: Documentation and analysis of Villa d'Avia by Rem Koolhaas. (Miller)
3 - Investigations in Decomposition & Transformation: The documented architectural work is decomposed and transformed according to rules inherent in the syntax of another work of architecture to discover and explore the sequence of decisions implied by the transformations. In transforming the initial works, the author develops notational conventions to create a series of steps from one perceived ordering system to another. These architectonic configurations are intermediary animations created by the designer, but they are synergetic and would not exist without the catalysts of the computer or the initial works (Figures 8 & 9).

Figure 8: A series of transformations explores the relationships between the formal order of a villa by Alvaro Siza and Le Corbusier’s Millowners Building. (Jonathan T.C. Chung)

Figure 9: A series of transformations explores the syntactic relationships between Villa d’Avia and Le Corbusier’s Villa at Garches. (Miller)

4 - Forming a Program Model: The previous ordering structures are transformed as they suggest notational conventions to represent the project program. The program is analyzed and transformed to examine how purpose informs the form and syntax of spaces which have the potential to elicit physical responses on a direct experiential level (Figure 10).

5 - Contextual Investigations: The project site is studied to discover forces, whether ecological, technological or cultural, acting on them from both without and within. A site is understood to have a context in both the physical realm of place and conceptual one of culture and history. It is at this point that teams are formed for developing the projects as collaborative efforts. Each team forms an ordering framework for the project on the site (Figure 11).

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6 - Syntactic Model of Building Systems:
The technology of building systems is considered, both as the systems facilitate the execution of ideas already developed and as ideas with their own ordering systems and expression that are overlaid in juxtaposition to the previous transformations (Figure 12).

Figure 12: Detail study of practice rooms. (Bell, Hartman, & Miller)

7 - Project Synthesis:
The process is synthesized and applied to making the proposed project. The project is placed within its site and developed (Figures 13 - 15).

Figure 13: View of preliminary computer model for the Culver School set in a computer model of Downtown Los Angeles. (Chang & Yuk)

Figure 10: Layers of a program model. The forms, generated from transformations of computer files of previous transformations, represent parts of the program for the project. (Chang)

Figure 11: Study of the forces of the site on the project. (Chang & Terrence Yuk)
Conclusions

The computer may be used as a dynamic force in the making of a design, establishing a synergism that precipitates an outcome the designers would not have reached using conventional means. The process developed in this studio encourages speculation and engages the student in questioning ways to use a new technology not to extend the technology itself but to extend its potential in studying perception and design transformation. Computer integrated design fosters relationships and transformations which would have remained dormant using other design tools. The evolutionary process of life growing and developing many permutations is a model for computer use, as transformations of existing orders may form the germ of ideas from organizations akin to the genetic material of organic matter. Pictorial fables may engage our eye and our imagination, raise our aspiration to make extraordinary places. But the computer is only the catalyst. It is the designers who use computers, to delineate information, to read from it possibilities for what might be, and to develop and enrich overlays of infrastructure, materiality, and human experience, who have the potential to transform the making of architecture.

Footnote


Figure 14: Volume study and theatre interior for Colburn School. (Chang & Yuk)

Figure 15: View of physical model and final computer model. (Bell, Hartman, & Miller)
References


