

RGB winds are blowing in the Design Studio

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This paper presents the results of two design studio elective courses offered to students in their second and third semester of studies at the Design Studio Department, “Universidad Politécnica de Valencia, UPV.” Classes are based on a methodology that directly relates the language of architectural form and space, to the language of the specific software being used. Our focus is not only to discover what may be represented, but most important what may not, and why. We aim to point out the differences between architecture as perceived and experienced by a human being, and its digital representation as a computer data structure.

At the Digital Design Studio, students are faced with a sequence of two projects so as to learn the basics of architecture, while developing their skill to build a digital representation of it. The first exercise within this CAD sequence is reading and analyzing a built project: a study of precedent. With this exercise we aim at two goals: to decipher the keys or parameters of architectural design, from drawings and pictures, trying to recognize an “architectural language”; and to learn a particular syntax of digital modeling. The second exercise is a project of a single family house within a narrow rectangular site and with only one street elevation. With this project we focus on the strong impact of stairs on the organization of functions and circulation, the illumination and ventilation of spaces with double heights and patios, and study the power of the section to express clearly the organization of spaces.

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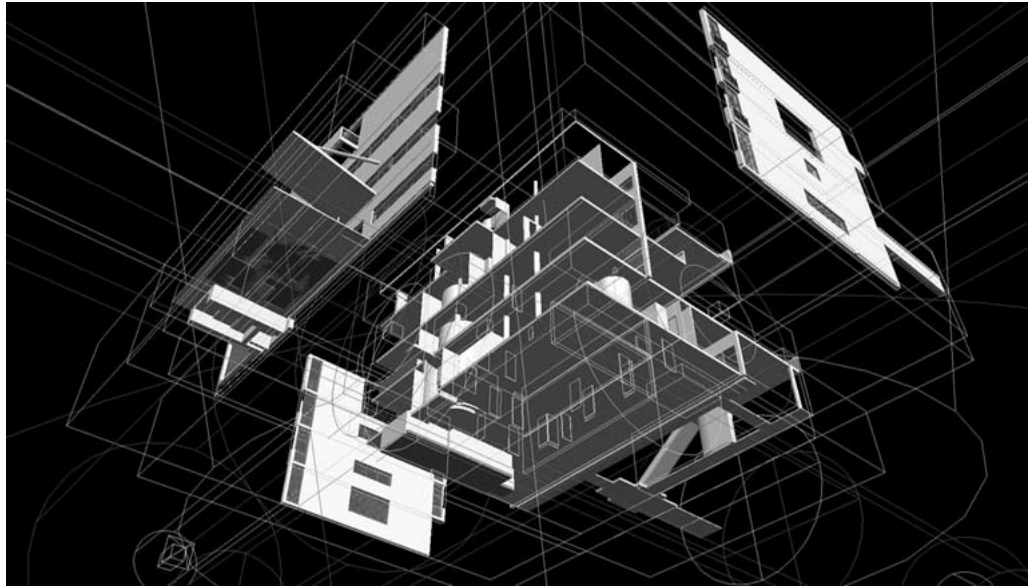
Introduction

Design Studio education is a slow and many times painful process, which is strongly based on a very simple procedure: students are confronted with a description of an architectural problem, and they are asked to generate a solution. This is what we call “learning by doing”. Students will look for advice about what is right or wrong, which direction to take, and why. They will try to understand what needs attention, change, or improvement, and specially what might be missing. Professors play several roles in this

scenario, but they all come down to a basic one: asking and answering questions about the process students are following. Professors must respect students’ personal decisions, still encouraging the idea of design as a search mechanism, with the belief that things will improve if attention is paid to the process itself.

The activity of designing in architecture is strongly based on the skill we possess to create and manipulate some kind of model, that is, some representation of our ideas. The capability to conceive three dimensional compositions is an early part of the

Figure 1 and 2 (right). Villa Stein, Le Corbusier. Modelled by Manuel Coronado.

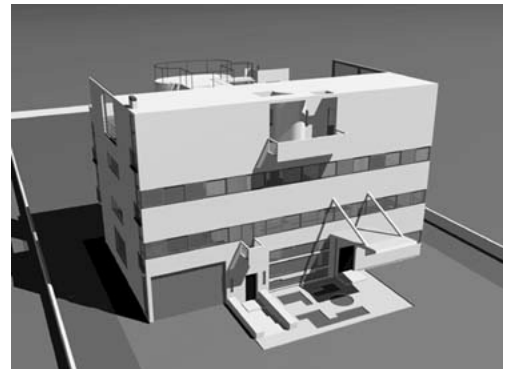


architect's education. The language we use when we design and the medium within which this language materializes are not tools, but instruments that let us analyze a problem, explore alternatives, and synthesize a solution.

A digital modeling system is to an architect, for many reasons, like a piano to a music composer; an instrument to develop his/her creative work, and not just a tool, alien to the process of design development. Tools are conceived by man with a predetermined goal; on the contrary, instruments are mediums where there is a language needed to express and execute our ideas, which may be regarded as dreams of an imaginary world that wishes existence.

We may differentiate four kinds of design media frequently used by architects: sketches or diagrams, drawings to scale, such as plans, elevations, sections or perspectives, physical models to scale or prototypes, and digital models at no scale. The first two are paper based, the third is built with appropriate materials, such as plastic, wood or metal, the fourth type resides in a computer's memory.

The use of digital models in design studio education may benefit from a methodology that highlights a common language between the parameters of architecture and the potentials of simulation specific to digital media. The key to learning architecture with the aid of a digital model is, obviously enough, to understand what both are and how they are built, to recognize the essentials of architecture



that are represented, and to become aware of those issues that are excluded.

It is certainly not easy to describe a digital model, but we may highlight those basic aspects that explain its usefulness within architectural design, and at least we should underscore that digital models are specially useful within design studio work, when properly combined with intense sketching. This is due to the formal precision of the digital model being completed with the speed and ambiguity of paper marks.

The main characteristic of a digital model is the presence of a three dimensional Cartesian space that generally lacks gravity, within which we may define geometric elements and ordered according to the laws of architectural composition. We may also show the “chiaroscuro” of a composition under certain lighting conditions. The possibility to represent light and shade within our model has an extraordinary pedagogical value, and leads us towards reflection about the behavior of direct and indirect light in architecture.

It is also spectacular the possibility of assigning to the several faces of all objects, symbolic or realistic textures which are useful first to lay out plastic and architectonic order, but also allow us to simulate the use of materials when constructing. We frequently ignore the enormous potential to structure and organize, that textures possess, and we end up turning the medium into an end, overestimating realism in our images.

With a digital model we may observe and manipulate interactively three dimensional elements and their superficial appearances, lights and shadows, with either orthographic or conic projections on a flat screen. This way we may represent the architecture of the past that no longer exists, the one that does exist nowadays, and the architecture that might exist in the future as well.

The pictures we take, and the graphic dialogue we witness but never record, are like photographs on digital emulsion of the world in the computer memory, and therefore in our memory.

Finally, there is something fascinating about digital models being able to represent time and to generate

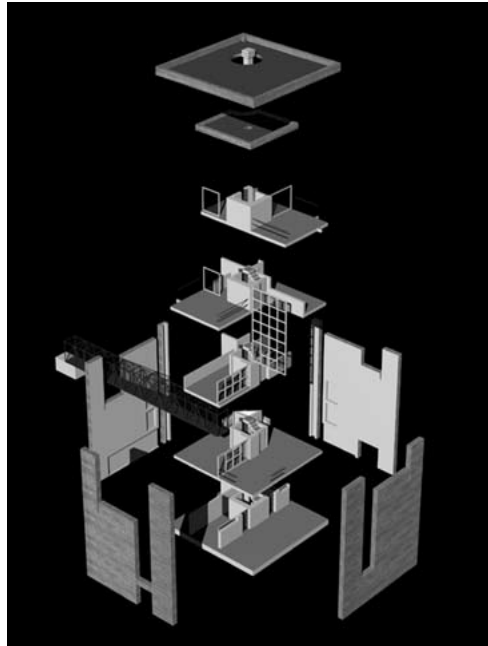


Figure 3 (top left) and 4 (middle left). House in Riva San Vitale, Mario Botta. Modelled by Jaime Maestro and Pablo Sancho.

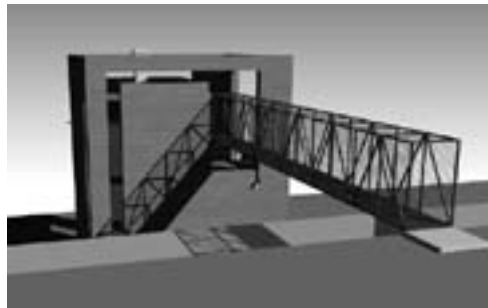


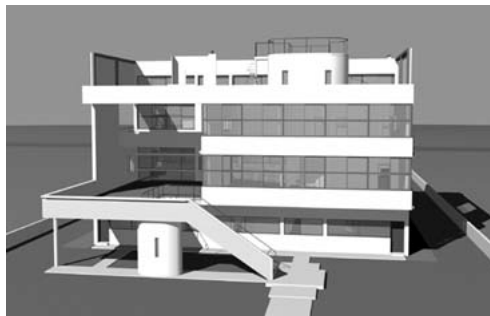
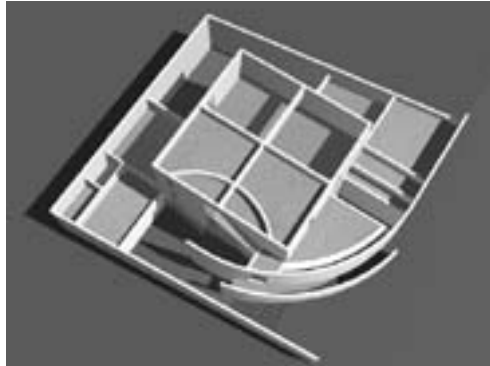
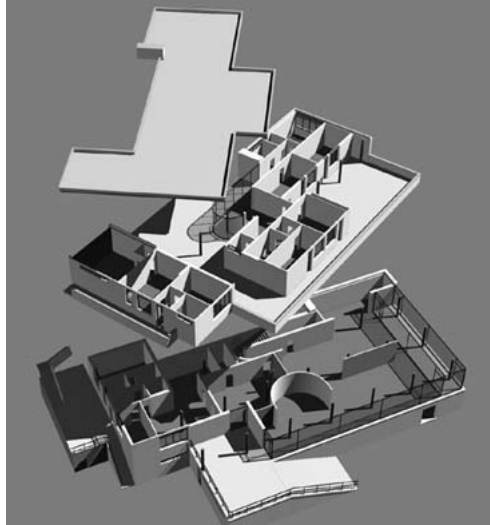
Figure 5 (bottom left). Tugendhat House, Mies van der Rohe. Modelled by Pablo Martín and Daniel Nebot.



Figure 6 (top right).
Tugendhat House, Mies van
der Rohe. Modelled by Pablo
Martín and Daniel Nebot.

Figure 7 (middle right).
Kidosaki House, Tadao Ando.
Modelled by Fco. Javier
Cases and Melquíades
Cutanda.

Figure 8 (bottom right). Villa
Stein, Le Corbusier. Modelled
by Manuel Coronado.



animations or movies that show us changes of geometry and composition, of lights and shadows, and of special importance to us, the movement of the point of observation.

A digital model may be described with words, photographed and exhibited, or simply opened and interactively manipulated. Being able to look at a three dimensional word of lights and shadows on a screen, resembles our vision of the world we live in. Nevertheless, a world we can not touch with our hands, where it is never hot or cold and the breeze never blows; that is to say, a world we can not inhabit with our bodies, where nobody lives, despite the visual richness that may offer to us, it will never be anything else but a rough metaphor of architecture.

Learning by doing is the way, and the approach is to follow a two steps sequence. Students first read or analyze a precedent work of architecture, and then they build a digital model of it, that is, they are asked to write their own design on digital media, with digital media.

Exercise 1. 2nd semester optional. 14 weeks.

Analysis of precedent

The first project in this sequence is based on the study of precedent as a source of design knowledge. Students choose a single family house which they have to *analyze and represent* as a digital model, in order to communicate its essence. This exercise has two goals: to decipher the keys or parameters of architecture, and to learn the syntax of a particular piece of software. The student must recognize the existence of elements and their compositional order in architecture, and he will try to identify the role they play within construction, and the spatial order they produce. To create a digital model that contains all this information is a valuable lesson about the internal logic of architectural form and space.

Exercise 2. 3rd semester optional. 14 weeks.

Design of a single family house

The second project in this sequence is a single family house within a narrow and profound rectangular site, and with only one street elevation. This exercise leads us towards thinking about the importance of the appropriate arrangement of stairs in relation to functional requirements and circulation needs. It also points us to the use of “patios”, or wells, for illumination and ventilation of spaces, since the site has so little contact with public space. Finally it is an appropriate exercise to reveal the power of the vertical section to bring alive clearly architecture as a three dimensional art.

Students first discuss functional and formal requirements, then develop their designs on paper until they are cleaned and structured. Later they start building a digital model of their designs with the intention to introduce further modifications. Eventually, all design comments are based on things that happen on a computer screen.

Web Reference

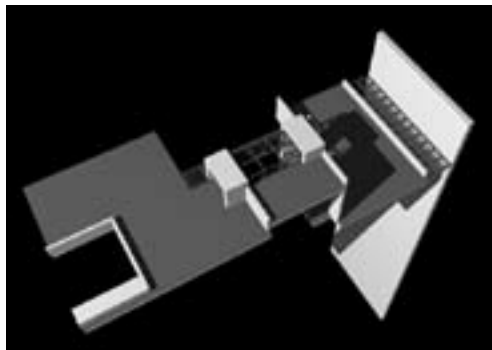
1. Location of the author's site is:
<http://www.arq.upv.es/tallerdigital>



Figure 9 and 10 (left).
Design of single family house,
by Pablo Martín.



Figure 11 and 12 (right).
Design of single family house,
by Daniel Nebot.



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