

# Design and Modeling as Parts of an Integrated Approach

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Usually the teaching of 3D modeling in computer graphics courses does not focus in an explicit manner on design problems. On the other hand, undergraduate architectural studios do not worry very much about 3D software resources and 3D modeling learning. Although digital studios under the “paperless” philosophy are based on intensive modeling, the existing gap between the learning process of architectural issues and the learning process of 3D modeling is not clearly stated. There are many inevitable links between design results and modeling techniques used for those purposes but, unfortunately, they are quite tacit and its consequences are often not explored in a systematic way.

In our school, some design studios have been very successful in introducing the representational capabilities of digital media, but the design process still tend to be very traditional, and it is not very open to include feedback from that instrumental dimension. This elective undergraduate computer graphics course focuses on this particular issue, exploring in a very specific and limited (not restricted) way the creative possibilities behind software operations, seeking to trigger architectural concepts that could be related with them.

During the semester we developed a series of exercises driven by some general themes which introduce students not only to the technical learning of software tools—instead they are intended to stimulate them to reach a critical approach to design thinking. In this manner we are trying to reinforce the exploration of formal and spatial relationships beyond the traditional methodology used by computer graphics courses.

Some themes that we have proposed were called: “Landscape Strategies”, “Programmatic Explorations” and “Program, Structure, and Skin”. Each of these themes was developed by students as design problems that had to be solved in first place through the use of a limited, but not restricted, set of tools. In this manner, “Landscape Strategies” basically looked for designing an urban or natural landscape from a series of interventions by means of boolean operations that modified a “terrain” solid model.

On the other hand, “Programmatic Explorations” search to foster the analytical potential that could be obtained through the systematic and selective handling of attributes. The main resources used were layers, colors, textures and lights, as well as symbols. Finally, “Program, Structure and Skin” was given as a case for studying the interdependencies that could be revealed during the design process among these three architectural categories, by means of the different possibilities offered by meshing tools.

We believe that the great versatility existing in the **form•Z** meshing tools is also due to the high degree of conceptual polyvalency suggested in the manner they work. In this sense, a particular combination of meshing tools could be useful to describe the tectonics of a building, i.e. its envelope as well as its structure within a modular system. However, the same modularity of the mesh, when treated differently, could serve to define more abstract relationships of the design, such as the functional and programmatic layout or other abstract patterns.

The following case (Felipe Rebolledo’s work) is an example of this last theme. Our statement for the project considered some initial constraints relative to the main tools to be used. In this manner, students had to design a building using as leit motiv the meshing tools, from polygonal mesh to Bezier and Nurbs. In order to complete the building they could use previously known tools, such as extrusion, sweep, boolean operations, etc.

From the modeling of an initial mesh, which had to be defined as an enclosure skin (C-Mesh, Skin, Mesh or Nurbz mainly) students had to derive a structural and a spatial system. As the mesh implies a modular system, certain relationships among the skin, the structure, and generic spatial programs could be explored and studied. A special emphasis was done in registering the design/modeling process in order to capture some of these relationships.

## CONCLUSIONS

We believe that a true stimulus to the learning process of 3D modeling in computer graphics courses has to be the commitment to the improvement of design quality. Indeed, as designers can only design what they are able to represent graphically, the students’ will to improve their designs has driven their own acquisition of advanced modeling skills. With this experience we tried to solve, partially at least, the division existing between architectural design learning and 3D modeling learning. In this manner both kinds of learning feed back to each other, generating an openness for discovery of new architectural possibilities.