

Experiment Digital Space: Composition with Elements Designed by Mies van der Rohe and the Importance of their Web Presentation

Didactical Design Methods Applied in Design Studios for Architectural and Cultural Sciences in Brazil, University of São Paulo and in Germany, Leuphana University of Lüneburg

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Abstract: *This empirical research project is a didactical teaching method intended to introduce students interested in space to theoretical architecture topics using specific computer capacities. In different variations, this teaching method was tested on students of Cultural Sciences and Architecture in Brazil and in Germany. With this method, even students without previous CAD or architecture experience can creatively design spaces. Visualization of the design process as Web design joins the individual aspects to a logical composite and applies the computer as “brain-craft” to complement handcraft. For the creative tasks, this means interaction in a complex information structure where the borders between the disciplines fade.*

Keywords: *Design; didactic; CAD; web design; interdisciplinary.*

Context of the research work

The Department of Architecture and Urbanism, EESC-University of São Paulo, USP, in Brazil, at the location of São Carlos, São Paulo State and the Department of Cultural Sciences, Leuphana University Lüneburg in Germany have had an active student and professor exchange since 2006.

In this teaching research project, promoted by DAAD and CAPES, between the Department of Architecture and Urbanism, USP, and the Department of Cultural Sciences, Leuphana, teaching experiences in

the bilateral and interdisciplinary context are gained. They are used for studies in the experimental design with CAD and the mutual organization and presentation of the information on the Web. The basis for the studies with the students as test persons was the condition that all students had only little previous experience in CAD-based planning and design. The seminar was held in Brazil and in Germany as an elective course and met for two hours per week. The results as well as their evaluation and analysis are presented at the conference.

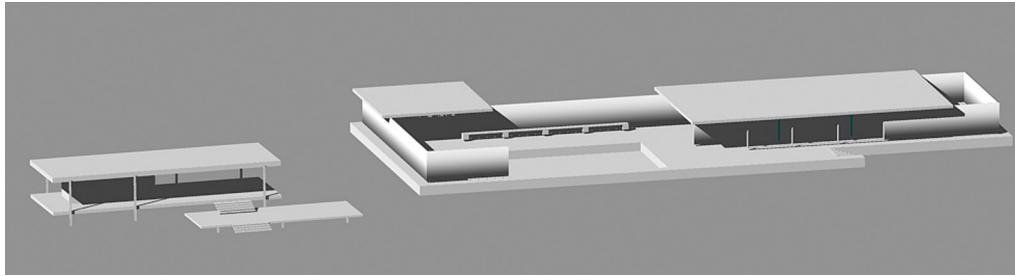


Figure 1
Models: Mies van de Rohe:
first Farnsworth house; sec-
ond Barcelona pavilion

The idea of the CAD-based design exercises and the additional didactical benefit to the students by presenting their results in web design

While a student of architecture is a rather technical designer - a producer of spaces - a student of cultural sciences is more biased to the critics of real constructed spaces. However, both are capable of space conception and/or have a common and very interesting complementary sense of space. To generate this capability, a seminar was developed in which, based on simple exercises in the virtual space, variations of the interpretation of areas with their own creative compositions were tested. Assuming the example of a high-performance building, the students would comprehend the true character of this space quality by deconstruction and, subsequently, the construction of space compositions.

“The deconstruction has to begin from the inside out, it has to take advantage of all subversive, strategic, structural and economic devices of the old structure” (Derrida, 2004), in order to finally show the structurally indefinable practical character of the truth.

To approach the complexity of space, information both existing and obtained is structured and mediated amongst outsiders by Information Technology Design. In this view, the initial position is a complex concrete situation, which by deconstruction and subsequent construction is transferred into a complex, virtual composition.

Design theory for the experimental CAD-based architectural sketch with given structured elements

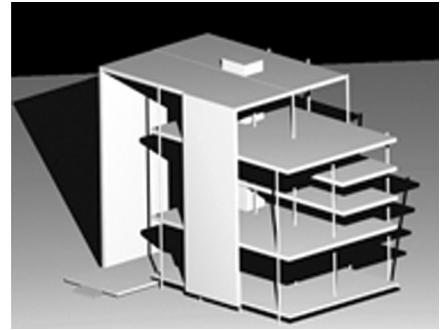
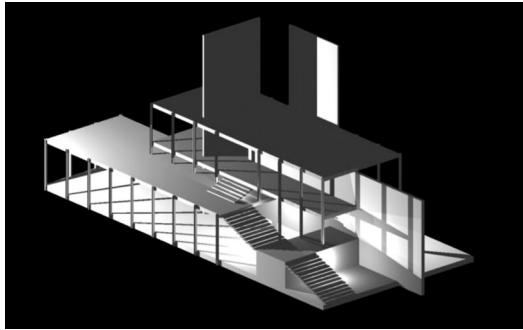
The basic draft theory demonstrates the constructional connection between the detailing and the whole building. An idea which is used in its area but without functional, city planning and material-specific restrictions, is an idea of modern architecture. The raster, lat. “rastrum”, is the name for a gardener’s rake, which leaves a trail of parallel lines. (Lexikon der Kunst, 1983). Grids arrange a surface and help the designers to transfer structures from the large scale to the detail. The application of the grids leads to the “release of the buildings from the ornamentation.” The buildings of the architects Berlage and Mies van der Rohe are exponents of a module- and grid-based design method.

Therefore the reference to buildings of Mies van der Rohe seems obvious and the execution demonstrates the features of this modern architecture. The Farnsworthhouse and the Barcelona Pavilion were used.

Exercise: Free composition with elements of the Farnsworthhouse

Divide the Farnsworthhouse into its elements and combine the elements again. The construction units are only to be copied, not varied, and nothing may be added. As a result of this process three tiling types, two column types and a block became available.

Figure 2
Students work: different types
of buildings, designed with
the same prototypes



This method resembles modeling with pasteboard and rod. The substantial proportions and organization parameters are already implied with the limited repertoire of finished units.(Figure2)

The freely designed shape of the body should be visualized only with light and shadow, without using materials.

In the following, this exercise was expanded by integrating it into an urban context. A real urban situation was given as a 3D model. This exercise required the students to bring the new space structure into a context with the environment. Thus the internal proportionality with the urban structure will have to be tested. The extended space reference will show to what extent the internal logic of the house can be combined with outside components. The visualization could be chosen to best suit the project.

Analysis of the results

Placing the interaction of light and shadow in the object-related architecture task in the foreground leads the students to a dialogue between positive and negative shapes, or substance and opening. This allowed them to, in accordance with Boetticher's method, use the reflection of a body or image to express the quality of a shape and to apply this evaluation tool to the light and shadow interaction of the body. "The shape of a body reflects its being! If you penetrate it – the riddle's seal dissolves" (Boetticher 1903).

Applying the city context as an additional measure of proportions and volume was a steep challenge for the students with no engineering background. In their evaluation of the project, the students stated how proud they were of themselves for mastering such a complex task in an elective course with no previous knowledge of the subject matter. The instructors found deficits in the design aspects of the city planning draft and determined that the design process needs to be controlled more closely. However, the creative aspects contained refreshingly innovative elements.

Design theory for the experimental CAD-based atmospheric sketch with the Barcelona Pavilion

Apart from physical dimensions, space also has atmospheric components which create a sense of space. As an integral component of the everyday, perception of color is in architecture a substantial design factor, which is not only planned on the basis of feelings but, beyond theoretical knowledge, also requires practical experience in application. Working and experimenting on a 1:1 model has so far been the only opportunity to examine function, meaning and effect of color in a close-to-reality manner. Thus it appears that space-bound color is not a simple perceptive value but the result of complex reciprocal effects of:

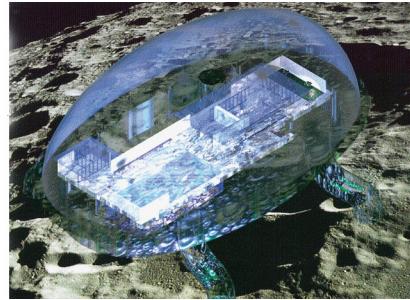
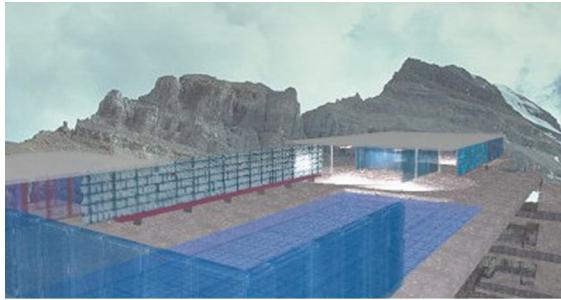


Figure 3
students work: first the pavilion in the mountains, second the pavilion as a living space on the moon

- Material and surface-related properties, e.g. spectral and optical characteristics, light permeability, texture
- Lighting, like spectral characteristics, intensity, distribution
- Observing in movement and time

“Atmospheres are something like an aura, a kind of fluid or gas; they cannot be secured. Bodies and things are coated by them and sometimes also permeated. An atmosphere spreads and one absorbs it, without taking notice of it immediately. How is atmosphere designed? Obviously atmosphere begins exactly where construction ends. It encompasses a building and adheres to its material. To design a building means to design atmosphere.” (Wigley 1998)

Exercise: Glass, but which one?

The Barcelona pavilion of Mies van der Rohe served as an experimentation object which years after its destruction was rebuilt at the original, however generally recognized, bad location. Finding a place for it

and, by colored adaptation of its environment, producing a color study using only one material made up the content of this exercise with a lack of practical relevance. The “open spatial arrangement” defines an architectural space without enclosing it. Mondrian describes the modern space as “infinite,” but “still limited,” like his frameless pictures. The combination of materials of the pavilion is just as innovative as the new interpretation of space.

Changing the space conception and the pertinent materials of the famous Barcelona pavilion is a challenge. Respect for the architecture in carefully adhering material studies to the object is essential. Look for a new location, for example in the given landscape, for the pavilion and develop appropriate color concepts. The material glass is given, however in its whole range: glass components, structure ornamentation glass, colored, printed on glass, etc. The design for a “pure glass Barcelona pavilion” integrates both colors and atmosphere from the environment. (Figure 3)

In the material study, flowing of space is transferred to the outside space. This approach

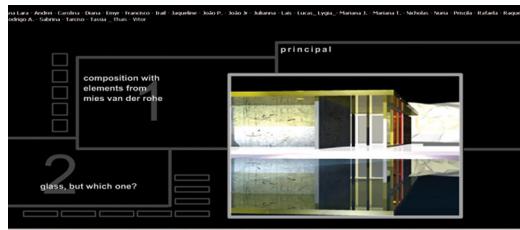


Figure 4
students entrance site, first Brazilian student, second German student

corresponds to the art philosophy of the 1920's as well as the space concept of Mies van der Rohe.

Analysis of the results

The color itself, with its play, breaks and contrasts, forms the framework of an image. A house should be adapted to its environment solely by the color translucence, without having previously fashioned it for the location. Choosing colors as a form of camouflage architecture helped the students without in-depth theoretical chromatic skills to achieve a valuable experience and to learn a convincing design approach. This task, distanced from actual practice, was more difficult for the Brazilian students than for the German students. Unlike the Brazilian students, the Germans were able to quickly detach themselves from the model of the surroundings given to them and transfer the pavilion e.g. to the moon; they were more receptive to futuristic solutions.

Organization of the project results in a web-based interface

Following the design process, the undergraduate students were asked to organize the project outcome in a Web-based interface connected to a Web portal. They should have been able at this time to provide in a hypertext environment visual and textual information about motivating forces, references used, representations and interpretations of the proposed project and also to provide a technical report on the learning process during their merging CAD-based designs and Web design tools.

The difference between the students at USP and Leuphana was that in Brazil they were well trained in Web design before the exercise, and in Germany they were not. (Figure 4) So in the latter case additional preparation was needed to familiarize the students with Web design tools and their conceptual differences to analog representation. An introductory theoretical class and tutorials were offered for this purpose. Our perception is that the previous knowledge of Web design granted an advantage to the

University of São Paulo students, already conscious of the need to compile and constantly register information during the design process as a non-linear type of organization. The Leuphana group of students had to deal with not only producing the CAD model, but also with the aspects of producing and organizing information for the Web-based interface, which were completed in a linear form.

Viewed this way, the students became familiar with a brain-craft - a tool for thinking, an instrument of reflection to be able to navigate confidently through the complexity of the design process and to hone their reflective perception.

Conclusion

For students with and without specific architecture ambitions, the virtual space is a suitable experimentation laboratory for analyzing architecture by deconstruction and experiencing its value for giving shape and form. Simultaneously, the creative work process provides identification with the original object and the grammar of its design principles. Today most students are able to navigate through virtual space due to their experience in playing computer games.

The overall results of the design exercises were of superior quality. Differences in designed space quality between students of Architecture and students of Cultural Sciences as well as between different cultural and geographical backgrounds were nearly imperceptible.

The joint use of CAD and Web design is understood here as providing an augmenting framework, in order to create a layout and its structural organization of information and its communication, and a more complete understanding of the architectural design. As Nicholas Negroponte pointed out in 1968, the pursuit of absent or disconnected information is an intrinsic part of the design process. The ability to deliver absent information should be part of the designer's competence. The Web-based interface offers not only the student a better insight into his own

design process, which nourishes creativity and decision making; due to the comprehensive presentation, teachers and colleagues are also able to analyze and to compare results in order to allow a collective critique, which can sustain the individual design process. Another interesting point is the realization of the exercises in two moments, which permitted the second group of Leuphana students and the teachers to benefit from the results of the previous group as for a starting point.

The methodically reproducible space exercises are performed like a laboratory experiment. In compliance with the demand for “research learning,” the exercises are designed as a basis for a university-level approach to the interdisciplinary teachings and contribute to the development of space concepts and evaluation.

Acknowledgements

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Figure 0: CAD model constructed by Ursula Kirschner

Figure 1: students work from: first Sabrina Fernanda Sartorio Poletto; second João Antonio Cassaro Junior

Figure 2: students work from: first Wioleta Wlodkowska, Julia Delfs; second Beate Friedrich, Birte Grau

Figure 3: students work from: first Diana Lino Izeli; second Lukas Kubenz

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