Abstract. The medium of the computer enables a change in process and input which has
the potential to define the concept of architecture and to develop the design
methodology in different ways. Last year there was a joint teaching project between
SEU in Nanjing and ETH in Zurich, which tried to build proper 3D model in the studio
teaching and transfer models between two groups. This joint teaching studio shows the
effort made to integrate the computer tool into the studio teaching process and the critic
system.

Introduction

The computer has recently become an important tool in our life. Using
the computer has changed many things especially the working process.
As we know CAAD has been developed in drawing, transferring and
modeling which brings tremendous possibilities for the spatial
presentation and thinking. As the teachers we could not avoid using
the computer in our teaching, but we also feel that the computer could
be easily misused in the teaching process. Last year there was a joint
teaching project between SEU in Nanjing and ETH in Zurich, which tried
to build proper 3D model in the studio teaching and transfer models
between two groups. It shows the effort made to integrate the computer
tool into the studio teaching process.

1. Modeling

In terms of teaching, maybe nothing is more important than input, which is
always the main issue in teaching process. The proper input in the relevant
phases is somehow the key to the whole setting of the design exercise. The
medium of the computer enables a change in process and input which has the
potential to define the concept of architecture and to develop the design
methodology in different ways. In our teaching program the process has been
divided into three problems solving steps: objects and background, volume and
its spatial structure, spatial structure in architectural meaning.
1.1 VOLUME

Normally we rely on our knowledge of the formal and functional characteristics of given architectural vocabulary elements to suggest feasible and useful ways of putting them together in compositions, or the other way round, to suggest appropriate choices and adaptations of elements to provide given functions in given contexts. Our intention of developing design studios in these steps, which translate the functional factors and spatial factors into the computer model elements, is to explore the potential for the use of the computer as a design tool in architecture design process for the second year students. We call the model the volume model, which is to input elements in the first step. Also in the first step the volume model is used to help the students think how to relate the building (volume objects) with the site (background).

In the different design exercises we use different volume models which correspond to the specific functions and forms. For instance in the primary school design the functional factors are the ordinary classrooms, special classrooms, walkways and gymnasium and so on. Instead of giving the text descriptions of the functions, three-dimension computer models are introduced. The students can get these functional elements which are already made as the blocks from the sever together with the site plan. These elements are easily put onto the site by the simple operation such as copying, adding, mirroring and rotating. The advantage of using the volume model is to try to encourage the students to start the design, thinking not only in functionally but also spatially.
In the design studio we find that building the object with simple3d architectural units allows for a great deal of flexibility, volumetric articulation and control. Methodologically the reduction of information is a step, which opens up a high degree of freedom of organization.

1.2 STRUCTURE

In the second step the structural model is introduced as a tool, which encourages the students to translate volume into space. The structural model is the key, which brings spatial elements into the design process. As the input elements, the columns, the beams, the horizontal slabs and the vertical slabs are given, which define and divide the space based on the volumetric organization.

Departing from a drastically simplified volumetric model, the structural model is built. The tectonic properties of the project emerge. Spatial transparencies and scale differentiation have been very well developed. Methodologically again this step is of the key importance. The structural model shows what the project wants to become.
As the second year students have no architectural technique knowledge bases we have to search suitable elements as input for the structural model. First we translate the volume elements, which are used as the input elements in the first step, to the spatial elements defined by beams, columns and walls. In these models not only the relationship between volume and space has been shown but also the structural concepts have been integrated into the spatial forms, which helps students to understand the tectonic forms. The building of complexity from one level of design (and model) to the next provides the student with clearly defined controls.

In the same way as the first step the students can get the input blocks from the server. The differentiation is that there are several structural blocks which could be given for each functional volume. So the students have to choose which direction to develop.

1.3 ARCHITECTURE

The architectural model finally presents the whole project and its architectural expression (as a result of the materialization). Further material differentiating is possible at this point. The quality of the working process can be seen in the handling of components such as rails or windows.
We have now seen how architectural elements and subsystems may perform a variety of physical, social, and symbolic functions. It follows that we can define types not only in terms of formal characteristics, but also in terms of functional characteristics. That is, we can classify the objects that we manipulate in the architectural composition not only according to what they look like, but also according to what they are good for.

In the second year design course we concentrate mainly on the architectural tectonic meaning. Another level of architectural interpretation is reached when materialization takes place. The architectural expression of the facade (or only the component) increases the complexity of the project drastically. Another level of formal logic is introduced.

Different from the last two steps the inputs are not 3D models but 2D drawings with material information. The students have to make material forms in 3D and put in their structural model. They should make the perspective on the eye level to feel the material texture together with the form, which is known as virtual construction and reality.

2. Transferring

Over the last two years we not only have been involved in experimentation with methodologies which use computer models as design elements but also have integrated Internet into design process. The project is of specific interest to both groups. Since it represents a continuation of work done in the area of design methodology and design education over the past five years.

In today's world, the global village, interactive communication and free exchange of data are only too easily assumed. All this is often only possible on the most primitive and therefore meaningless level. Professional nonsense is transmitted by a very sophisticated technology. Of course we do realize the importance of modern communication, which could be a powerful tool in the design studio to open the view for the students especially. As a teacher one must recognize that the problem is not what kind of sophisticated software could be used but whether we have the communication base. In recent times the technique is not the key problem but the meaning.
2.1 CRITIC AND DOCUMENT

This is specifically true since we believe in the importance of cultural differences and value the alternatives provided by history. Only if a common methodological and theoretical base is established, joint projects and professional exchange can take place. E-mail transferred the work generated by the design studio at Nanjing to Zurich, where the critical documentation took place. The results then were again sent back by E-mail as input to the ongoing design work.

The design studio took place in SEU Nanjing. The works of the students were transferred simply through E-mail to ETH Zurich phase by phase and step by step. In order to solve the quantity of the data problems the projects were sent singly. There were the same maps and the same insert points on both sides, so each project with different steps could be easily put in the correct positions.

In the design studio our works were done by AutoCAD and were opened as the library elements by ArchiCAD in Zurich. Since the projects were transferred in 3D, they could be easily seen in the different views in ArchiCAD, which shows a lot of possibilities in transferring between the different programs and different machines.

Based on the information the critical document were done in ETH, then again was transferred back to SEU also by E-mail.

The documentation delineates data, visualizes a process and articulates an approach. But more than anything else it provides the basis for further debate and examination. It is the first attempt in the visualization of an educational process, which proves studio cooperation possible.

3. Conclusion

The Medium of the computer enables a change in process and perception which has the potential to alter spatial or formal understanding of the making of architecture as powerfully as did the idea of perspective in the Renaissance. If we could say that it was the industrial revolution which prompted the birth of the modern movement in architecture, then how the ongoing information society would effect the evolution of the architecture is really an important issue especially in design education which the young generation will be cultivated.

While we are wondering at all the beauties the information society brings us, there would be the danger of getting lost in all the wonderful techniques which should only be recognized as an important tool in architectural meaning. The fundamentals of architecture would be always the understanding of the space defining process.
effected also by the context and the construction, which is somehow the starting point for us to design the studio teaching program. Using the computer in this sense is always related to the specific problem resolving process. Actually we find it really good to introduce the CAAD to the studio teaching in the beginning years which allows the students to explore the property of the space on the 3d level and understand it in human dimensions. Because for them the problem would be the little time to develop the skill of presentation which hinders the expression of their idea of the design. Also, the exchange between the different cultures with the help of the internet brings us the other dimension of the criterions and insights, even though there are still a quite number of limitations on the technique level

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