LOCAL VALUES in a NETWORKED DESIGN WORLD

ADDED VALUE OF COMPUTER AIDED ARCHITECTURAL DESIGN

DUP Science
Abstract

This paper considers transition from physical modelling to digital methods of the creation of architectural forms. Every type of creation has constructed the proper means of expression and its own methodology. The main thesis of this paper is that a specific character of the composition activity of an architect is determined by the modelling methods. As the research on architectural modelling, the two methods of creating spatial architectural forms (cardboard model and computer model) have been compared. Research has been done on the basis of the same exercise for both media. The process of creation proceeded in the same way, too. As the start point students have found the inspiration. Each student presented photos of existing architectural objects and a text, which explained the reasons of the choice. Next steps were sketches of the idea and realisation of the model. The achieved results of creative activity fully confirm the thesis of the research.

PREFACE

As Akin states, the choice of the presentation method is equivalent to the choice of the problem solution method. (Akin, 1986) Each type of art has specific and unique characteristics of artistic expression, its own language. Specific character of the composition activity of an architect is determined by the modelling methods. As the research on architectural modelling, the two methods of creating spatial architectural forms (cardboard model and computer model) have been compared. Research has been done on the basis of the two courses: Architectural Composition and Digital Architectural Composition. In our research we consider transition from physical modelling to digital methods of the creation of architectural forms.

Our course of traditional architectural composition in general was concentrated on the six abstract composition exercises (façade, solid model, transformation, walk through the open space, sequences, walk through the square). In 1997, after many years of experience with teaching traditional architectural composition we introduced the digital media to this course. Because exploration of 3-dimensional space and 3-dimensional volumes in space is one of the most basic and fundamental architectural activities, for experiment we chose the solid form. Traditionally, searching for forms at the conceptual design stage is performed by using sketches, drawings and physical models. In our experiment we wanted to check if it is possible to do the same thing using the computer-
based 3D modelling, experiencing no physical limitations of the 'real' substance. At the same time, at the early design stages, when formal value is sought, computer modelling can be done almost intuitively. The achieved result was very promising and we decided to 'translate' traditional exercises into digital space. In 2000 we elaborated the whole course of digital architectural composition. The main part of this course became a part of AVOCAAD teaching web page. This course included four groups of projects: bas-relief (division, rhythm, façade); solid composition with specific formal values (dynamic, light, massive, monumental form); transformation - from cube to parallelepiped; walk through (desert, valley, tunnel). In 2002 we added to our course the fifth project - walk through the surrounded space (space of celebration, contemplation and action). As the basis for the research that was done during the winter semester of 2002/2003 academic year we chose four of the projects: façade, solid form, walk through the open space and walk through the surrounded space. This research report is divided into two parts. The first is description of the projects for both traditional and digital design methods. Each description of the project for traditional course of architectural composition includes general remarks on exercise, goal, and description of the exercise. In Digital Course to the description we add information about required skills and software. In a few cases in this course we changed limitations concerning the geometrical elements, their colour and light, and of course final results. Practically in all exercises we added animation as the obvious element. The second part of the rapport is presentation of the results.

The process of designing in both Traditional and Digital Course proceeded in the same way. The starting point was searching for the inspiration. Each student presented photos of existing architectural objects and a text, which explained the reasons of the choice. Next obvious stage was preparing the sketches of the idea. Sketches were discussed and on their basis the model of the composition was realized.

EXERCISES

Façade

Description
An element of each architectural object is space: both inside and outside the object. There always exists a real border between them – plane. The way plane is shaped greatly influences both the spaces. To define the plane one has to be familiar with the rules of applying such composition methods as geometric characteristics of form, divisions, weigh ratios, rhythm, symmetry, accent, colour, texture or proportions. Plane can divide as well as join. There are an infinite number of intermediate states and their types between these two cases. Thus, this topic, whose core idea is to surface and sculpture the plane, is also an attempt at discussing the abovementioned states.

Goal
The goal of this exercise is to arrive at cohesiveness and harmony of composition through the use of basic composition methods (such as relief, rhythm, contrast of mass and space, symmetry and accent). What is most important is to determine the vertical composition attitude (top ↔ bottom).
Exercise
Another thing that ought to be done is to design a relief composition – a façade of an object of unspecified purpose. This façade will only be viewed from the front, thus it should all be within an effective perception field. The composition should be arranged on a 30×30 cm field. The viewer is on horizontal 30×30 cm surface. Perception point should be marked with a human shape, as its position determines the size of the façade. The façade may be built of different types of prisms. Their size and number depends on the conception. The elements may be arranged within the plane in any way. The only limit concerns the depth of the composition, i.e. the distance from the furthest element to the composition plane, which cannot exceed 5 cm. The mock-up should be monochromatic (white on white). (Figure 1)

Figure 1. Sketches of the facades.

Solid composition with specific formal value

Description
Architectural form is the point of contact between mass and space. Architectural forms, textures, materials, modulation of light and shade, colour, all combine to inject a quality or spirit that articulates space.
A classic form expressing man’s relation to the surrounding reality is experiencing specific emotions. By expressing one’s attitude to the idea presented in a piece of art, estimating it, one not only ascribes it a material form but also encodes in the created piece certain emotions, one’s subjective experiences. Each piece of information concerning the surrounding world has emotional undertones. Perception of a given form within the surrounding space evokes certain emotions, which, in a way, are relevant to the form.
**Goal**
The goal of the exercise is, on the one hand, getting to know the rules of applying such composition methods as: geometric characteristics of form, divisions, weigh ratios, rhythm, symmetry, accent, colour, texture and proportions, and on the other hand – connections between the composition methods and emotional evaluation, such as dynamism, monumentality, lightness and massiveness.

**Exercise**
A solid composition placed within a 30×30×30 cm surface should be designed. The composition will be viewed from different perception points located around the object. A point from which, according to the designer, the composition appears most effective should be specified. Any cuboid solid can be used to build the form. Their size and number depend on the conception. 1:100 scale is compulsory. To make the evaluation of the object scale easier, a human 1,7 cm figure should be placed on horizontal plane. The mock-up should be monochromatic (white on white). (Figure 2 and 3)

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**Figure 2.**
*Traditional course of architectural composition. Solid form - inspiration and sketches.*

**Figure 3.**
*Digital course of architectural composition. Solid form - inspiration and sketches.*
Passing through open space

Description
The path of our movement can be conceived as the perceptual thread that links different interior and exterior spaces together. All paths of movement or of people are linear in nature. Linear composition can be characterised by interrelations between spatial forms (solid planes and space between them) and by time and movement. The sequence of elements making up the spatial configuration of urban assumption is a sequence of spatial pictures which we perceive as we get to know a part of or entire configuration. It is a perfect embodiment of Sequence as a certain type of Peripathetic reflection or architectural story. "Since we move in Time through a Sequence of Spaces we experience a space in relation to where we’ve been and where we anticipate going." (Ching, 1987, p., 228)

Goal
The goal is to create a Passage. A passage through something most important, something that has no beginning or end. A passage ‘Through’ and not a way ‘From-To’. A space-time should be created in which things Happen and different moods are created. Interlinks between present, past and future sensations should be anticipated.

Figure 4.
Traditional course of architectural composition. Passage through the open space - inspiration and sketches.
Exercise
When applying architectural forms, a linear composition should be designed within 1.5×6.0 km space. The composition will have different emotional impact. Any geometric forms and various materials (cardboard, glass, mirrors or metal) can be used. It is advisable to apply colour. The scale of the mock-up should be 1:100 on a 15×60 cm board. (Figure 4 and 5)

**Figure 5.** Digital course of architectural composition. Passage through the open space - inspiration and sketches.

The surrounded space

**Description**
Urban landscape consists of a series of interiors. They are more or less legible, have different size and evoke various tensions and impressions. "Its visual form, its dimensions and scale, the quality of its light - all these qualities depend on our perception of the spatial boundaries defined by elements of form. As space begins to be captured, enclosed, moulded, and organized by the elements of mass, architecture comes into being." (Ching, 1987) The shape, colour and pattern determine to what degree it defines spatial boundaries. The form of the square plan can create platforms for sitting, viewing, or performing.
Figure 6. Traditional course of architectural composition. Surrounded space - inspiration and sketches.

Figure 7. Digital course of architectural composition. Surrounded space - inspiration and sketches.

**Goal**
The main goal is to get to know the possibility of creating, through the use of composition methods, enclosed urban space whose purpose will be received unequivocally.
Exercise
In the assigned 40×40 m space an action (dynamic), contemplation (quiet) or celebration (monumental) space should be designed. Similar as in the previous exercise, any geometric forms and different materials can be used. The scale of the mock-up should be 1:100. (Figure 6 and 7)

RESULTS
The results of the four above-presented exercises performed by students can be divided into two groups. The first group shows a lack of any visible influence of the applied creation method on the resulting form. This concerned mostly the façade projects. In both creation methods the sketches of designed forms did not differ from one another, and, as a result, forms designed both in traditional way and through applying computer media were similar. The similarity concerned the degree of façade complexity. The reason for this situation is two-fold. Firstly, there are formal limitations imposed by the task and secondly, there is little knowledge of software capabilities. Certain differences in results could be seen in the process of creating a solid. They concerned both the chosen inspirations and the sketches and final models. Forms got more complicated, curvilinear planes and surprising transitions among particular elements appeared. Students ‘discovered’ the possibility to apply light to model form. Simultaneously, simple computer animation (walking around the solid) allowed for a dynamic search of the best perception points and better understanding of visual frame. The second group of results is connected with Passing through open space and Passing through surrounded space. Considerable differences appeared concerning both the inspirations and the sketches of the designed form. It should be mentioned here that some of the students preferred to design directly in digital space without the use of pencil. They claimed that they are only able to present their project verbally. It made teacher and student co-operation much more difficult, since the idea traditionally accepted in designing graphic convention was broken. Forms chosen as inspiration were much more complex, often organic (shells, leaves) or abstract (Mobius tape). Frank Ghery’s works were very popular! As a result, forms that could not be made in a traditional way were created. The level of freedom in designing space by computer methods differed substantially from traditional models. Gravitation was no issue there. It must be emphasised, though, that not only ‘liquid architecture’ or the Guggenheim Museum in Bilbao, F. Ghery, type of architecture was created. Also, ‘no-function’ (the traditional meaning) spaces were created. The only function of space was evoking emotions. Forms got more poetic and metaphoric. Students paid attention to the possibilities they had through applying various materials of different transparency. Many projects concentrated on playing with light and not form. Another important aspect differentiating the results of traditional and digital course of architectural composition was the ability to animate the passage. It required of the student to write a sort of scenario, to determine important places and spaces, to define perception points and the moving speed in certain placers. In traditional models the viewer is ‘outside the space’. He is just an onlooker. In digital models, he is ‘in space’. One becomes an active participant (user) of the space. The perception process becomes dynamic and the onlooker’s emotional engagement increases. It is possible now to convey the emotional
message of the designed spaces more precisely. This helps to better understand the relations between composition elements as well as their influence on emotions. When comparing the works we also observed two worrying phenomena. First, some of the works resembled bad computer games. They were too literal and contained too many details. Second phenomenon is hard to be named directly. We called it – ‘Because the computer can do it!’. It is student’s response to teacher’s question about project motifs. It seems to result from too little consideration on the one hand and too much fascination with the new medium on the other. The problem may have to be considered in greater detail in the future.

Figure 8. Examples of student’s works. Left row shows physical models, right - digital.
Conclusion

Conclusions may be divided into two part. First - concern the achieved results of the experimental way of teaching of Architectural Composition. Analysis of the possibilities of using computers at architectural compositions course has shown that using the new digital media for modelling architectural forms gives us new possibilities but at the same time creates new problems. Thanks to the new information technology we have a new chance for changing the process of thinking about creation of the architectural form.

Second conclusion is connecting with conference topic, and discusses dependences between local and global actions, and gives the answer on the question about the focus of our activity: locally or globally. At first stage of our research we thought globally and acted locally - from the Bauhaus heritage to the Bialystok course of Architectural Composition. At second stage we thought locally but acted globally - from the Bialystok course of Architectural Composition to the AVOCAAD web page. And at the end of the experiment we thought globally and acted locally again. From the AVOCAAD web page to curricula of our school.

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References