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Spatial Experience in Real & Virtual Environment as an Urban Design Tool

1. Introduction to a Specific Problem

The Institute of Urban Design and Spatial Planning at Faculty of Architecture, SUT in Bratislava provides general education for Students within their urban studies which concern building of cities: their planning and regulation. The Institute and its teaching program is closely related to architectural education provided by the Faculty.

It prepares architects to specialize and design city-making structures. The Institute's concepts are based on the assumption that building and forming a city, its further development and assessment are more than just a composition of its spatial features or architectural components. We perceive a city as a structure, which is a complex expression of an organic system of urban environment. A city, as an organic structure, is based on functional, operational and spatial relations which are daily perceived or digested through complexity of their informative sense. Thus, a city as an expression of humane inhabitation's structure creates conditions for living activities of the inhabitants.

Theoretical and practical program for the subject of Urban Composition belong to basic academic preparation of a student to achieve professional qualification of an Architect. This subject is mainly focused to studies of esthetical relations at designing the city forming structures. It applies creative and exact theoretic principles at different positions of a spatial city structure in flow of their dynamic changes. Didactic aim of the subject is support of students' imagination, creativity and sense of sustainable urban environment during the analyses, perception and evaluation of an urban structure. A general aim of the subject is also to analyze urban and architectural design in more detail and to point out designing and redesigning of urban spaces and atmosphere inside of urban environment (Fig. 1 and Fig. 2).

2. Importance of Spatial Experience

Beside the hand-made drawings of various examples of creative and compositional categories in their urban spatial expression, during the seminars which are part of Urban Composition, students make model studies of nodal and linear spaces (models of Streets and Squares) in which they articulate various compositional elements by different modeling materials (Fig. 3 and Fig. 4). Consequently, students make esthetical and compositional analyses of the structure in a real stylized model



Figure 1: Models of Urban Composition subject



Figure 2: Model as presentation medium of Urban spatial structure

Figure 3: (left top) Model of Linear Structure – Waterfront

Figure 4: (left bottom) Model of Nodal Structure – Square



Figure 5: Outputs from analog-digital endoscopic technology for further postproduction process of sequences to video-clips or other image modes for multimedia presentation or archive

with main focus to urban marks, spatial tectonics, sceneries and atmosphere inside of model. Analog-digital endoscopic technology with a data projector, which is installed inside the laboratory, will enable visual verification on pedestrian horizon. Cinematographic matrixes are important outcomes of this verification and after postproduction processing of these sequences, students can make video-clips or other multimedia presentations or they can just store materials for their further work. (Fig. 5)

The main advantage of the above mentioned method is real imaginativeness for all other members of the student group, spatial and temporal dynamic of visual perception, which activate creative interactivity of students. In this way, generative spatial experience of the anticipated environment is preferred, which is a requirement to esthetic managing of the informative and character complexity. In this way, the thought of Albert Einstein: "Imagination is more important than knowledge" becomes a true.

3. Utilization of Spatial Modeling within Urban Designing

Media, which enable the compositional interactivity, play a great role in the creative process of forming the city spatial structures. Mostly, there are used physical-analog-artifact models or virtual-digital 3D displays. The differences are between conditions of spatial perception: physical are perceived as three-dimensional; digital (for now) only as a 3D simulation. Spatial or space-making composition is imaginative in every respect and significantly contributes to quality of harmonic complexity of the architect's creativity (Fig. 6). Artificial model is first material modification of creative idea or draught. Three-dimensional physical model provokes spontaneous spatial imagination and communication of space creating compositional parameters. By hand we observe articulation of formal perception, on which can all coauthors participate. In this way, a model becomes the first medial presentation of interactive process of compositional forming and evaluation of objectives (Fig. 7).

The manual spatial modeling is considered, from more than one aspect, as interactive "sketching" which is the most effective tool of promotion (Fig. 8).

The students at advanced level are recommended to continuously use the potential of this composition at their design of models at studios on subjects (Fig. 9).



Figure 6: Spatial composition is imaginative and meaning-fully contributes to harmonic complexity of creative architect's statement

For certain aspects, we are trying to avoid imagination, which untimely causes composition in virtual area of computer graphics (definitive expression, color and graphic perfection...) (Fig. 10). The purpose of a work-model is to document creative-compositional principle of creating spatial structures by visual demonstration. Their uniqueness is that they enable mental interaction of basic senses of humane creativeness: eyesight and touch. In this way, modeling gives us active and three-dimensional perception by optic sensors in real time and space. It provides production of experiences that are close to reality and based on theoretical principle of aesthetic composition. Spontaneous student's reactions are depending on individual creative reactions and impulses. Physical modeling is in term of the mentioned aspects imaginative and creative and provides application of creative ideas, single person or whole team.

By verification of models through an endoscope, creative and presentational interactivity is generated. Higher levels of semi-finished working models are evaluated by an endoscope (set on eye level): by static views and formations, or by digestion of dynamic continual perspective according to principles of urban composition. This allows us to obtain and store the so called static / dynamic space visualization, which is after the postproduction process presented with the final project documentation. Projection of dynamic perspective / experience like dynamic continuum is ultimately cinematographic sequence as on a movie projecting screen, but it is not absolutely interactive (Fig. 11).

After an overall evaluation of this method we can point out, that creative interactivity in real model displaying and adjusting expressly supports creativity of architectural and urban design.

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The spatial – dynamic experience is modeled / stimulated in real time and real in a real model which is created smaller than in reality. The dynamic experience as dynamic perspective in biological horizon enables to evaluate and revise our draught from different points of urban composition (Fig. 12).

4. Spatial Experience in Virtual Environment as an Urban Design Tool

Dynamic experience achieved by visualization of PC graphic software uses spatial imagination through simulated move of the perceiver. It is similar to standard cinematography (Fig. 13). Usually, students present the so called "flights" over their digital models. Rarely, they present expected experiences of the future



Figure 7: Interactive 'verification' of composition aims on studio work-model

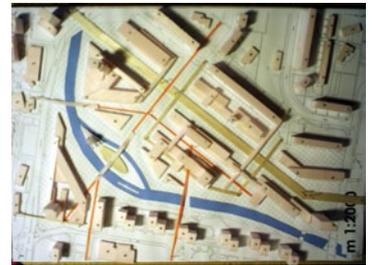


Figure 8: Interactive 'sketching' on studio work-model



Figure 9: Composition of organic urban operative structure on studio work-model



Figure 10: Composition and Presentation of proposition by software's of PC graphic

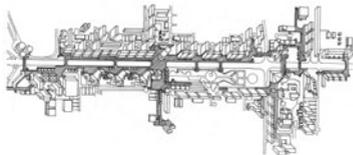


Figure 11: Composition of dominant complexes of spatial conception. Verification of Spatial structure's expressions at composition of dominant spatial complex

perceiver of urban scenario in pedestrian horizon. Orientation of pedestrians is regulated by principles of urban composition and its retention positively influences the further required identification (Fig. 14).

5. Conclusion

The application experience of the method indicates that spatial modeling as an Urban-architectural Design Tool has several specific advantages compared to contemporary potential of visual media:

- The method has become a creative and interactive medium for quality aesthetic and compositional analyses of the alternative solutions.
- It increases the quality of spatial visual demonstration and has didactic meaning at repeated search and decision making within the individual stages of designing process.
- Presence of the working model represents real aspect of the creative, evaluative and simulative process.
- The method creates convenient conditions for collective creative work, production of new ideas which can be revised by compositional reactions.
- In final stages of the design process, the method enables anticipation of custom perception of the environs atmosphere in real time and real place.
- Thanks to ICT compatibility, inter-medial processing of graphic outputs is guaranteed, as well as is their postproduction or storing.

Literature

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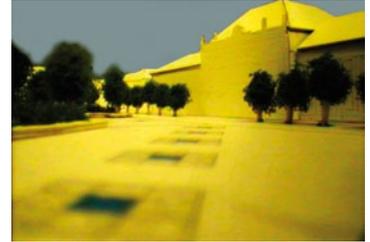


Figure 12: Regeneration of main square in PZ Šahy – visual verification on model M1:500 (Author: Bc. Marcel Mészáros)

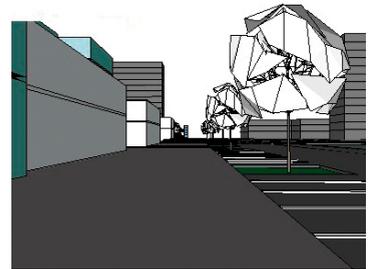


Figure 13: Dynamic experience by AutoCAD. Digital endoscopic simulation of Spatial Experience in eye horizon – CENTROPEA. Authors: Bc.Oravcová-Bc. Otrisal-Bc.Petrenková

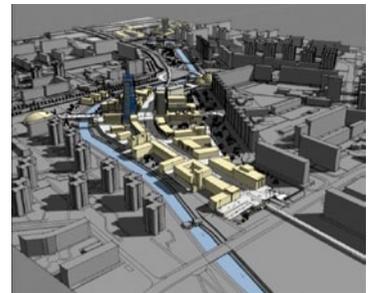


Figure 14: Complex visual CAD urban study presentation of Petržalka's city centre. Authors: Bc.Karaffa-Bc.Marcinková