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CAD in Slovak Architectural Education and Practice

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This paper describes experience with Computer Aided Architectural Education and other modern tools such as visualization, animation and multimedia presentation in Slovak architectural education and practice. The process of learning to use these computer tools started, in fact, only five years ago. Today it has become one of the most interesting and powerful areas in education, research and practice.

Introduction

The task of architects and urbanists is the formation of an interdisciplinary contact zone. From this special point of view their task is the formulation of ideas, principles, objectives, algorithms and other necessary features of the system, into creative dialogue. Face to face with practice, influencing each other, architectural education is now involved in the new dimensions and dynamic development of modern CAAD (Computer Aided Architectural Design) and multimedia systems in Slovakia today. Computer support in the education of architects, formation of education, support of architect's routine processes, graphical outputs, projecting, modelling, animation, visualization, as well as audiovisual and multimedial methods of presentation of architectural and urban creations make up a remarkable part of the present architectural scene in Slovakia. Three-dimensional verification of architectural and urban designs in the context of their existing environment and direct connections with other professions have become most effective tools in architectural practice. Use of knowledge and experience in instruction, education, and architectural and urban practice as well as international research and cooperation are areas in which architectural education and even practice are influenced by themselves in a very dynamic way.

All this brings with it many new questions. Some of these are closely connected with the recent past and it is possible to explain them; others are waiting to be explained in the near future. Here the comparison with some Western solutions is often used as an example. Much more important, however, is the fact that Slovak architects, urbanists, designers, engineers and constructors must find their own way in the different social, economical and even technical environment. And, as the present shows, they are able to do this. This process is strongly supported and influenced by architectural education.

Instruction and Education

Although the first contacts with computers were presented at nearly every university, computer support in architectural education really started with IBM PC compatibles after the COCOM restrictions had finished.

Computer Support in the Education of an Architect and Formation of Education

The Department of Computer Aided Architectural Design (DCAAD) played an important role in the field of architectural education. This Department was founded four years ago at the Faculty of Architecture of the Slovak Technical University, Bratislava. It aims to introduce to students and the architectural public the possibilities of computer techniques, applications and corresponding software in architectural and urban design. It also encourages computer literacy and a full range of usage by the realization of student's own projects with graphical support. At present the CAAD educational activities in Slovakia are of course spread over several universities and schools. Groups such as the Faculty of Civil Engineering, Faculty of Mechanical Engineering and Academy of Fine Arts are playing their very important roles in the field of geometrical 2D or 3D modelling and realistic visual modelling for applications in design, architecture, construction of atypical architectural objects, work on advertisements and graphic designs, computer animation and multimedia presentations. The formation of education is influenced by the development in CAAD systems. The education of/via CAAD systems today has a stable place in teaching structures and curricula and aims to teach architectural design with computer support.

Computer support for Architects' Routine Processes

The first phase of the use of computers in architectural practice was computer support for architect's routine processes. CAAD systems are very powerful tools for carrying out such processes and it is possible to use them very quickly. They are now used in almost all architectural studios or enterprises. Most packages used in Slovakia for routine processes are based on AutoCAD and other AutoDesk products. The reason is that this software has nearly 90% of the market in Slovakia. Computerizing of routine processes has had a remarkable effect in all professions. Although architects had to wait a little until software and hardware were user friendly enough, it is now clear that computerized architectural design is an optimal base for the development of an architectural project from initial ideas, through intermediate phases, to the final design. The possibilities for use of computer supported routine processes are much wider today - from routine 2D and 3D drawing to the use of libraries, different packages, database systems, geographical information systems and of course visualization and presentation systems.

As a result of its experience in this field it was possible to create an Autodesk Authorized Training Center (ATC) at the Department of Computer Aided Architectural Design (DCAAD) of the Faculty of Architecture, Bratislava. This is the only ATC center in the field of architectural and civil engineering in Slovakia. The department basically provides education for students of architecture on several levels. Via the ATC it also prepares basic and advanced courses for architects, civil engineers and technicians and in cooperation with the employment authority, special courses for the re-qualification of unemployed people. These are recognized in architectural practice in very positive way.

Computer Support for Creative Activities

The connection between computer support and some artistic creative applications was not understood, at first, by those responsible. The result of computer support for creative activities achieved by students of the Faculty of Architecture (DCAAD) and Department of Visual Media of the Academy of Fine Arts, Bratislava can persuade everybody that this is worthwhile. Computer support is, here, once again, a very powerful tool with which to present ideas and creativity in such fields as; graphic design; architectural design; design of interiors and architectural details; landscape and urban design; design of three dimensional structures; objects of art; and non physical sculptures. This can also be connected with mathematical processes e.g. using deterministic L-systems and fractals for the modelling of environmental objects (trees, leaves, clouds, etc.). Generally speaking computer support for creative activities has a future in the presentation of human creative activities of all kinds both in real and virtual forms.

Computer Graphics Output, Projecting, Modelling and Visualization

This is one of the most pragmatic and readable parts of computer support of architectural design in education and practice. This is, however, at the same time, one of the most critical areas. There is relative freedom in the creation and modelling of ideas but they must, in the end, be presented as a hardcopy on some kind of output device. This means less freedom and this is disturbing users very much. This is closely connected with the presentation of architectural design in education as well as in practice.

Several questions are as yet without solution (in the field of architectural education with/via computer support):

- Do computers help or hinder students in their study? How do students who work with computers compare with those who are not using computers? Are computers disturbing students in their creative ideas?
- How should studio projects using classical methods and those using computer support be evaluated
- What kind of presentation of students studio work has to be done? Do we, in practice, need a final "paper" presentation? Has computer presentation (visualization or multimedia presentation) enough quality?
- Isn't the result of computer modelling just a few pretty pictures?
- How should such a dynamic and, in fact, aggressive subject as computer support be included in educational schemes and curricula?
- What software should be used in architectural education, for what purposes and why?
- What should the profile of graduates look like and how should computer literacy influences this?
- What is the relationship between architectural practice using computer support and architectural education?
- Is it economic for the school to have such huge investments in hardware, software, netware, etc. instead of fortifying classical methods of education?
- There are many more questions which are probably the same at all educational institutions.

Some of these questions were discussed during the ECAADE Regional Meeting in May 1994 organized by the Faculty of Architecture of the Slovak Technical University, Bratislava. Details of some of the conclusions that were reached can be found in the conference proceedings.

CAAD in Slovak Architectural Practice

Computer Aided Architectural Design now plays a very important role in Slovak architectural practice. These days about 90% of architectural offices are using computers in some way and about 50% are using CAAD systems for design, modelling, visualization and verification of their architectural ideas. Here the connection with other professions of building science is very important and has resulted in a ten fold increase in the speed of routine processes. The main directions or applications used in practice include:

- Computer projecting, modelling and visualization
- Creation of environmental and geographical information or database systems
- The verification of architectural and urban designs in the context of their existing environment

Presentation of Architectural and Urban Designs

This is one of the most remarkable and clearly readable applications of CAAD systems in present architectural practice. Today an architect or designer has at his disposition very powerful tools with which to present his 3D solid model. Although it is expensive such presentation is used for important investments, architectural and urban competitions, design in historical environments and the evaluation and verification of architectural and urban designs. All this is influencing architectural education where such subject were included in the educational structure for CAAD systems. The main fields for presentation are as follows:

- Three-dimensional verification of architectural and urban designs in the real environment
- Graphical, audiovisual and multimedial methods of presentation of architectural and urban creations
- Use of exact methods for the presentation and study of creative activities in the areas of architecture and the construction industry and protection of national historic and cultural monuments and treasures by the means of interactive multimedia systems

Research Activities

Current research activities are concerned with new architectural and urban design methods , 3D solid modelling, 3D visualization, animation and multimedia presentation of architectural, urban, graphical and industrial designs. This is reflected by a new approach to architectural education methods and systems. Research at educational institutions and practical applications are concerned with the following:

- Formation of a system of elements, libraries and graphical databases
- Modelling of the real and imaginary world and its presentation by the means of computer and other information media
- Use of interactive multimedia systems (archivation, documentation, presentation, study and promotion of architectural and creative works)
- Interface between user and computer
- Virtual reality systems and their applications
- Use of knowledge and experience in instruction, education, and architectural and urban practice
- International research cooperation programs

International Cooperation

Cooperation via ECAADE

There are numerous active contacts with universities and schools working in the same field. Most contacts are created on a multilateral basis through ECAADE - Education in Computer Aided Architectural Design in Europe. There is at present collaboration between Slovak schools of architecture and ETH Zurich, TU Budapest, TU Wien, TU Graz, TU Warsaw and schools in Aarhus, Barcelona, Belgrade, Eindhoven, Glasgow, Madrid. Other contacts also exist inside EAAE - European Association of Architectural Schools and ACSA. To make such contacts more effective in the Central and Eastern European region links were made between universities in this region. There are a number of faculties or schools of architecture which are in the geographical neighbourhood. For this reason there have been several ECAADE Regional Meetings organized and hosted by the Faculty of Architecture of the Slovak Technical University, Bratislava. This year such a meeting was organized as part of the first ECAADE Regional Workshop. The main theme was "The role of CAAD systems in studio work". To allow the participation of as many universities as possible there were no conference/workshop fees. The workshop and meeting were both very successful. More than ten schools participated in this event. The chairman of the workshop and meeting was Prof. Ivan Petrovič from Belgrade. Although not yet ECAADE members some of those present expressed an interest in establishing closer contacts with ECAADE. The aim of the workshop was to present educational methods and schemes and their application to the students studio work and to exchange experience with regards to CAAD education at the participating universities. These questions were presented and discussed in a very informal and constructive way during the ECAADE Regional Meeting. Details of these discussions can be found in the conference proceedings and conclusions.

International Research Cooperation Programmes

There are several research schemes and projects based on previous contacts between institutions. Several new and very important projects in the field of the application of CAAD systems to architectural education were initiated during the ECAADE Regional Workshop. Here the Internet network was presented as a very effective way of connecting institutions and exchanging information, software and experiences.

Conclusions

The development of CAAD systems in Slovak architectural education and practice has been very dramatic in its relatively short four-five year history. From the first steps of learning and teaching software packages it has developed to the point where it is now in the processes of creating and defining new methods and approaches. These are concerned with, on the one hand, acceleration of the routine work of an architect and the connection with other professions in the building industry, and on the other, visualization, computer vision, image processing and multimedia applications. The virtual world created in the virtual studio is present, with all its positive and maybe also negative influences, in Slovak architectural education, research and practice.

References

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