THE ELECTRONIC COMMUNICATION AS A PART OF CAAD EDUCATIONAL PROCESS

AUTHORS
Mirjana DEVETAKOVIC
Milan RADOJEVIC
Faculty of Architecture
University of Belgrade
Bulevar revolucije 73/2
11000 Belgrade
Yugoslavia
mirjana@arh.arh.bg.ac.yu

ABSTRACT
Considering demands of contemporary architectural practice to shift spatial and cultural barriers and became more global and more creative, this paper analyses the role of electronic communication within the process of CAAD (Computer Aided Architectural Design) education. After explaining Virtual Design Studio phenomena, represented by several worldwide university projects, this paper focuses on the reflection of those projects in rethinking the CAAD education approach at the Faculty of Architecture, University of Belgrade. The case illustrating the problem is The Virtual Group activity within the Course "The basics of Computer Application in Architecture". Some examples of student work are given as well as several conclusions based on two-year experience.
THE ELECTRONIC COMMUNICATION AS A PART OF CAAD EDUCATIONAL PROCESS

Introduction
Information technologies and telecommunications are involved in almost every human activity. With its most recent achievements and their application, those technologies significantly characterize the last decades of this century. Nowadays, virtual teams exist in many disciplines that need communication between remote participants. The most important fields in virtual communication are medicine, education, electronic commerce, science, design etc. The process of designing and constructing a building gathers the large number of collaborators, either architects or other engineers, technicians, artists, economists, etc. Coordination of their activities and information exchange between them was always the important preposition for operative, efficient collaboration of design team. As some theoreticians have been anticipated, the decade of the 90's brings the technological movement in the field of CAD. This paper came as an outcome of two parallel activities: forming a concept of spatially distributed architectural practice and development of educational process in the field of computer application in architecture.

EAO - European Architectural Office
The idea of spatially distributed architectural practice was born in 1996, when the Belgian architectural group EAO - European Architectural Office, established its departments in Belgrade (Yugoslavia) and Lisbon (Portugal). In that way originated EAO-BE, EAO-YU and EAO-PT. Conceptualizing the system of collaboration in architectural design over large distances, we remarked the importance of the electronic communication, based on Internet services, as one of the most significant support tool (Radojevic et al. 1996). Inside this multinational, multicultural and multilingual environment, the wide range of technical and organizational aspects of this collaboration model has been tested.

Figure 1 explains the sense of spatially distributed design studio idea. Computers on the left side represent the electronic design studio, equipped with all hardware and software necessary for design process. We may suppose that this studio has been located somewhere in Europe. People that have been appearing on the right side of the picture represent a managing team that travel over the world and make contracts on the global market. The man above, superior directing with his hand, has been situated on the one of construction sites in the world, for example in Siberia.

1 "While the CAD/CAM field has come a long way in four decades thus far, its future certainly holds many challenges... It is anticipated that new design and manufacturing algorithms and capabilities will became available. These applications will be supported by better and faster computing hardware, and efficient networking and communication software." (Zeid, 1991).
As we can see, the structure of collaborators working on an architectural project is complex, multidisciplinary. Every participant operates as a design team member. For us to realize this process we can use the concept of virtual studio, considering application of modern electronic communication.

**VDS - Virtual Design Studio**

Parallel with the activities connected with architectural practice, we have explored the similar experiences from different worldwide university projects (Devetakovic 1997). The internationalization of design process manifested via numerous university projects has been continually appearing in period 1992 - 1997, commonly titled VDS - Virtual Design Studio. At the beginning the most important participants have been American universities, but later a large number of architecture students from universities all over the world took part in VDS projects (Maher et al. 1996 a). They had opportunity to participate in spatially distributed design process, collaborating with colleagues from other countries or continents, other cultures and different linguistic areas. We have been involved in VDS activities through WWW since 1996, when our country had been connected on Internet.

The appearance of Virtual Design Studio project in early 90’s was one of most interesting challenges in contemporary architectural education. With the respect to all of its numerous participants, we think that the heralds of VDS idea came from American MIT, Canadian UBC, Australian USYD, Swiss NTH and Hong Kong UHK (Maher et al. 1996 a). But, in our research in domain of VDS we had to consider, not only the most important projects, but also their remarkable reflections in developing countries like those in Slovakia (Kosco 1997), Poland, etc.

The history of VDS was theme of one master thesis and several published papers, where we made attempt to discover the significant stages of VDS development and the principles of its conceptualization. But most of all we wanted to estimate our possibilities to work on such collaboration principles and to propose some projects.
The Electronic Communication as a Part of CAAD Educational Process

<table>
<thead>
<tr>
<th>ILLUSTRATION</th>
<th>PROJECT</th>
<th>SUBJECT</th>
<th>CHARACTERISTIC</th>
<th>SPACES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EDS’92</td>
<td>urban house Krakow</td>
<td>electronic design studio</td>
<td>real</td>
</tr>
<tr>
<td></td>
<td>VDS’92</td>
<td>Robo Works warehouse</td>
<td>creative correspondence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VDS’93</td>
<td>Kat Hing Wai village</td>
<td>asynchronous architecture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VDS’94</td>
<td>Shanghai Li Long housing</td>
<td>time, space, virtual design studio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VDS’95</td>
<td>Family house in the countryside</td>
<td>exchange of idea</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VDS’96</td>
<td>Hong Kong Monument for 1997</td>
<td>symbiotic partnership</td>
<td>virtual</td>
</tr>
<tr>
<td></td>
<td>VDS’97</td>
<td>spaces of communication spaces of connection</td>
<td>hyper - space</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: The overview of VDS projects in the period 1992 – 1998.

<table>
<thead>
<tr>
<th></th>
<th>VDS’92</th>
<th>VDS’93</th>
<th>VDS’94</th>
<th>VDS’95</th>
<th>VDS’96</th>
<th>VDS’97</th>
</tr>
</thead>
<tbody>
<tr>
<td>ftp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-mail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-mail with attachment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>videoconferencing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WWW presentations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: The electronic communication tools used in VDS projects (the darkest is the most important tool within particular project).

The Virtual Class '97/98

Inspired by VDS projects, but considering the fact that we still didn't have certain technical conditions to participate in some of ongoing VDS projects, we have decided to start with one kind of "preparative" program. While teaching “Basics of computer application in architecture”, we have established a "Virtual class" consisting particularly of students, which already had their own personal computers. The virtual class worked for the last two semesters ('97/'98), e.g. 28 weeks. During that time students had to become
familiar with basics of electronic communication and had to explore some particular problems of its application in architecture. In the first semester students of our virtual group had two hours weekly in our CAAD Lab to meet their teacher, to see each other and to improve their knowledge in electronic communication (using of e-mail, ftp, Web browsing etc.). In the second semester they hadn’t reserved a special time in our CAAD Laboratory. They had to communicate with their teacher and with other colleagues only electronically from their own PCs.

Assignments:

Introduction – the different services of Internet
• Begin with e-mail correspondence (inside the CAAD Lab and from home)
• Make the mailing list of all participants and filter messages coming from the members of virtual group
• Write a CV in Serbian and English language
WWW presentations in architecture
• Browse architectural resources on Internet and collect several WWW presentations of architects or architectural teams round the world
• Make your own WWW presentation
Animated components of WWW presentations
• Find the examples of animated GIF’s and make a collection
• Discuss the role of animated GIF in architectural subject representation
• Make your own animated GIF treating dynamic elements of architectural objects
Web based representation of spatial forms
• Make a 3D spatial composition of cubes and make renderings of it.
• Find the possibilities to insert representation of your composition in existing WWW presentation of your work

The teaching was supported by Web-based brief treating different subjects of informatics applied in architecture. After this experimental work we consider this group of students well prepared to participate in VDS project, either in our academic area, or in some international projects. The explained program was an important experience for teacher too, because there were many specific demands, more engagement and lot of differences, especially in the second semester - the period of "real" virtual communication. The results of this program are completed by several Web presentations. Some examples are shown as an illustration on Figure.
The Ongoing Virtual Class ‘98/’99

In the academic year ‘98/’99 we decided to continue special "Virtual Class" programs enriched with some new aspects in using Internet based electronic communication within the CAAD teaching. The small and specific linguistic areas like ours haven't the possibility to supply the professionals in various fields with all necessary and most recent publications. This is the case of our country. On the other hand, nowadays Internet offers a wide range of resources for on-line education, particularly in domain of applied information technology. Those courses we can find on the Web, either within the academic networks, as a support of software producers, or as some efforts of independent professionals or professional groups. In our ongoing "Virtual Class" project we decided to include some new potentials of Internet based electronic communication:

- On-line courses
- On-line reading

Instead to make a composition of some given elements and to represent it by inserting pictures and CAD drawings in Web presentation, in this program students have to learn the basics of VRML (Virtual Reality Modeling Language) and to make an example of virtual world. For that purpose they have to use one or several VRML courses available on the Web. The assignments for this year is enriched with the next contents:

VRML - The World of Virtual Reality
• Choose one of the offered Web based VRML tutorial and try to become familiar with the basic technique of Virtual Reality
• Using the VRML create an object in an existing virtual space\(^2\)
• WWW based publications
• Read the Mitchell’s City of Bits available on Internet (Mitchell 1995) and choose the chapter to discuss with colleagues
• Find the architectural journals on the Web and recommend it to other colleagues.
• Internet based collaborative work on final presentation
• Gather all results in one WWW presentation of the virtual group (available on the address: http://www.arh.bg.ac.yu/mirjana/informatika)
• Vote for the best presentation inside the virtual group
• Discuss the results of virtual group experiment

Conclusions
Realizing the large potential of electronic communication in architectural design based on Internet services, we decided to include this aspect of collaboration, establishing special group of students, called "The Virtual Group" on the course "The basics of computer application in Architecture", at the Faculty of Architecture, University of Belgrade. The participants in this particular group were selected considering next criteria:
• owning a personal computer with possibility to connect on Internet
• Certain previous knowledge of the standard program prepared for the rest of students: Windows, MS Office, CAD (AutoCAD, ArchiCAD, Allplan, Arch +...). During the last two years in the programs of “The Virtual Group” participated over 30 students. The program has been evolved during the time and covered next fields:
• Internet based services
• Html as a media for representation of architectural information
• On-line education
All the subjects have been elaborated by developing an individual, professional Web presentation for each member, as well as the particular design team and the entire group. The program is still active and has been realizing on three ways:
• by direct communication in the studio
• by asynchronous communication, via e-mail
• by exercises of synchronous electronic communication
The results of two-year experience of working with "Virtual groups" we would like to include in our standard teaching program as well as in our practice within EAO and in some continued education courses. This program prepares students and professionals, not only to use computers to design and represent their ideas, but also to be able to communicate with other professionals and to become competitive partners in global design society.

References

\(^2\) This stage of program has started at the end of February 1999. The brief is inspired by the exercise description for announced Workshop on the 2nd AVOCAAD Conference.