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Virtual Communication and IT in the Reflection of Architecture and Urban Design. Experiences from international studio projects

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1 EUROPEAN ASPECTS AND PREMISES

Students are learning in the European Learning Space. They navigate themselves in it and select courses and programmes according to their needs, interests and their actual life conditions. They look for the best provisions in terms of quality and services universities provide.Universities are to be conceived as nodes in this Learning Space delivering knowledge resources and learning facilities, based on research. They build their reputation on the quality of their research, education and services to the students. Education is lifelong, open and flexible. By integrating e-learning to their systems, openness and flexibility can be improved essentially. New strategic goals of generation and contribution of universities partnerships, common programmes, flexible and reusable learning contents, virtual mobilities, internationaly accepted acreditation and author´s certification result from such visions. Virtual universities, which include the cooperation and common use of the electronic learning contents and /or virtual mobilities of students and professors, are still the great challenges.

Design and building of virtual environment in the field of architecture, urban design and international projects of sustainable growths, promotes of the multi-disciplinary, multicultural and multiligual processes. By utilization of ICT, multimedia and e-learning environment, it is possible to create communicational, creative and tutorial platform for international portfolio of works, professionals, lecturers and students. Usage of the virtual multimedial environment and videoconferencing supports favourable conditions for European higher education institution to work together for developing sustained public services and to compete worldwide with respect to an e-learning higher education market creation.

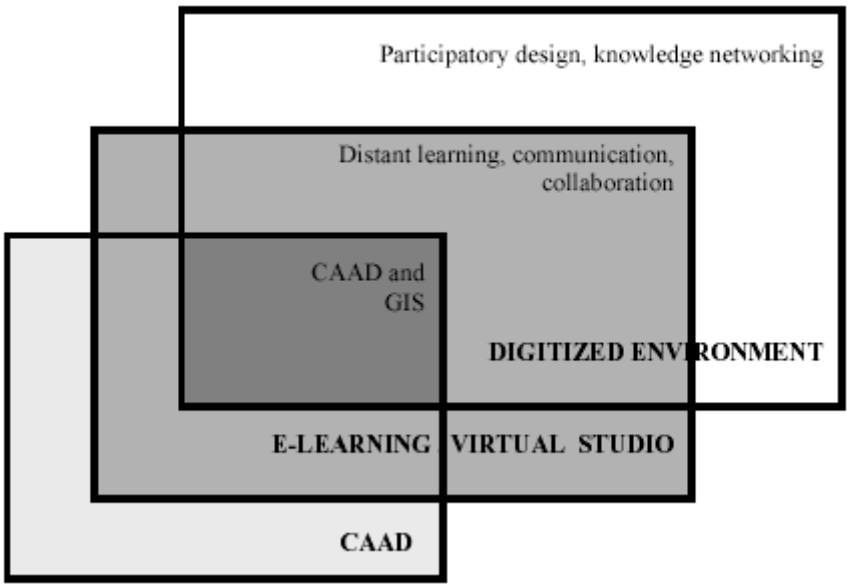
2 RESEARCH TOPIC

Research at the Department of Computer Aided Architectural Design at the Faculty of Architecture, Slovak University of Technology in Bratislava, ranges with the issue of benefits and limits in the utilization of modern information and communication technologies in the architectural, town planning and landscape designs education and practice. It is supported by the wide scale of teaching applications in students´ design projects and studios, with the various combinations of internal and abroad students and professors.

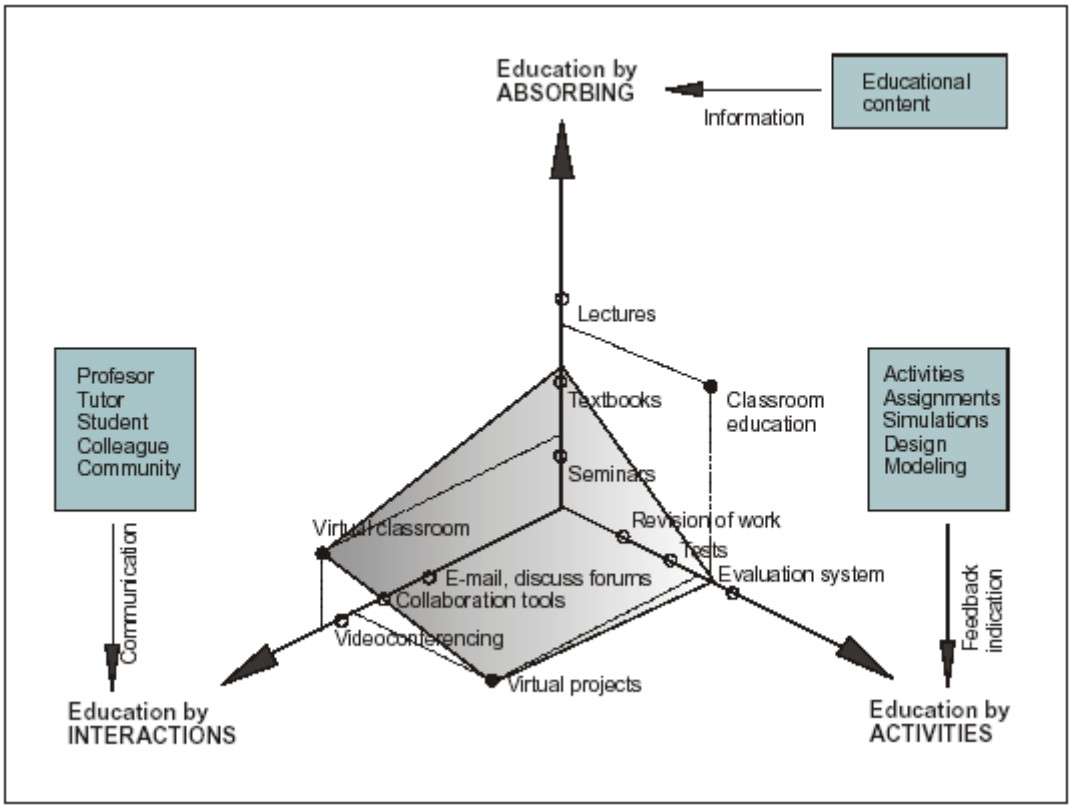
The creative design studios play the key role in architecture and urban design. They also dominate in the learning proces at our Faculty. Utilization of e-learning systems (with their standard understanding as electronic developed courses, seminars and tests) can be hardly conceived in the architectural studios. They need permanent interaction and communication during the design process and teaching assignments often varied, followed by actual issues and social acquisitions of architectural environment design. The aims follow the assessment of necessary extent of attendance forms of education and the acceptability of distant forms of education in architectural studios and the allocation of technological and pedagogical bases for them.

2.1 Analyses of utilization of ICT in architecture and urban design

The tools of ICT can provide much help to simulation of real, multiprofessional environment. New technologies and methods give the new tools and possibilities reflecting the new techniques of education, research and practice. Networks and Internet enables data and information exchange, but also the exchange of experiences and cultural property. Internet itself is not just a tool for surfing and enjoying, but preferably represents a tool for collaboration, workgroups, virtual studios or long distance education. Utilisation of ICT in architecture and urban design can be split into three main fields, following the complexity of application of new technologies in educational and creative process (Scheme 1).



Scheme 1 (Joklová, 2006)



Graph 1 : Basic forms of education (Joklová, 2006)

2.2 Virtual studio

„Virtual studio“ represents the studio education at long distance, conducted at various geographical places, applying more universities, students and professors and employing the ICT for communication, consultations, data, image and sound transfer, evaluation and project presentation.

Virtual studio enables long distance cooperation and consultation during the studio work. It´s no matter where the student is present at the moment. If the project details are digitally adjusted and accessible through Internet for pedagogical process, students and professors can virtualy communicate and consult their work on the various stages of elaboration, present it online via videoconferencing tools and data transfer. Virtual mobility can be understood as a complement or substitute to physical mobility. It may precede and/or extend

the physical mobility and thus offer new opportunities for students, who do not want or cannot benefit from the physical mobility.

2.3 Communication.

Communication has the substantial function in the electronic education and supplies the loss of immediate conversation, present in classical form of education. From the chronological point of view the communication can be:

- synchronous – happens in the same time
- asynchronous – occurs at the different time periods

The most common tools of asynchronous communication, which are realized through the ICT, are e-mail, web discuss forums and discuss groups. Synchronous communication (like telephone, chat, as an interchange of small text messages, and various types of videoconferencing) provides the basic favour of immediate response.

2.4 Videoconferences

Videoconference is the most sophisticated form of synchronous communication using ICT tools. It supplies the real time communication with the simultaneous projection and sound transfer. Videoconference implemented between two points is called two-point videoconference. Multipoint videoconference connects more than two participant points.

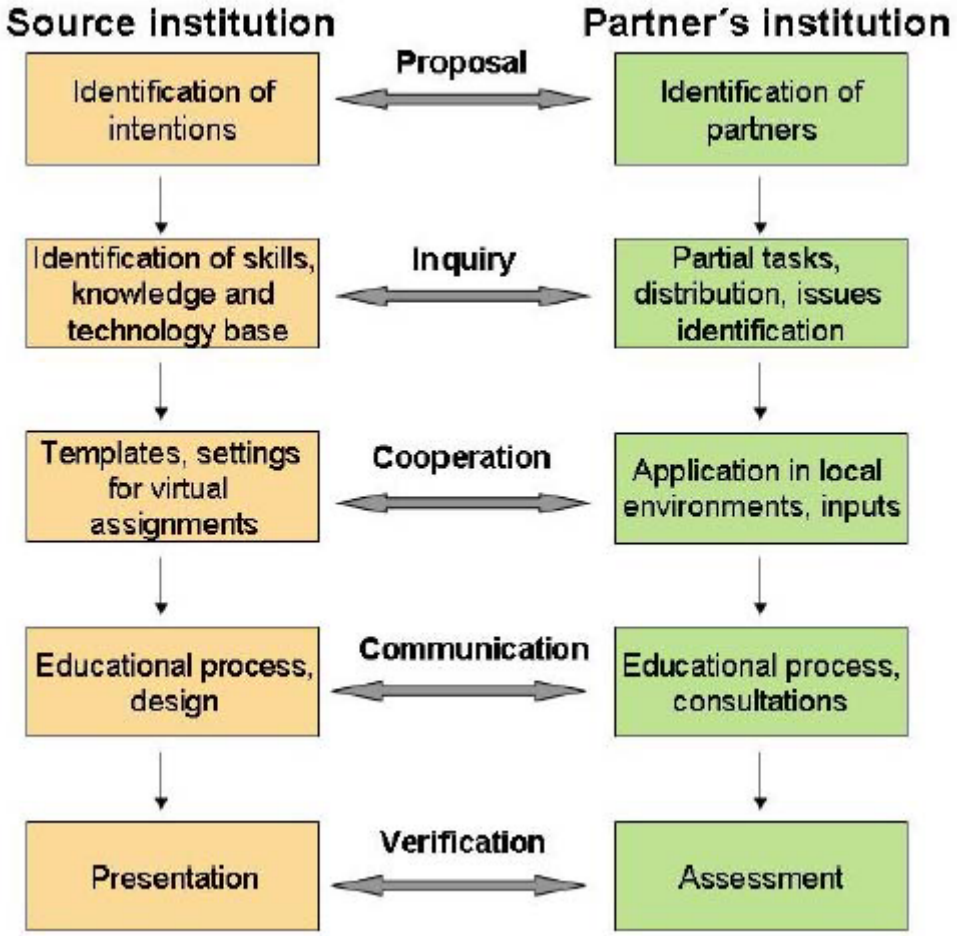
According to the technology of implementation, can be two essential forms of videoconferences :

- videoconferences through ISDN links (Integrated Services Digital Network) – are relatively cost demanding for the basic equipment and for the service (the payments for ISDN call), but are very credible for good sound and image transfers,
- videoconferences through computer nets and Internet (Netmeeting, MSN, Windows Messenger, FirstClass, VRVS, Skype etc.) – require the minimum of technology equipment (web camera, headsets or microphone and loudspeakers), and provide the low cost services (just the payment for network services). The specific time delay of the image and sound transfer, due to the data overload of computer nets, is their disadvantage.

Videoconferencing enables the visual presentation of the design in real time. In the architectural education it represents the method for verification of the design quality. On the other hand, professors and students have an opportunity to join the design process even if they are on abroad mobility. By the means of videoconferencing tools the education converges to practice and therefore could represent the important methodology tool in architectural education.

3 SYSTEM METHODOLOGY

Process of the long distance education in architectural and urban design studio starts with preliminary analysis of sources and demands of initializing institution or the draft of study programmes offered and wanted. Education gains the aspect of the commodity more and more. On the bases of identified intentions educational institution searches for inverse partners. Cooperation starts after the bi or multilateral agreement with the preparatory stage oriented on the specification of studio subject, time table, guarantee, priniples of long distance communication and the data transfer. Long distance studio teaching follows afterwards, based on the conventional tools of synchronous and asynchronous communication for consultations. Conclusive phase includes the final presentation of studio projects and the assesment by the participated students, tutors, guarantees and institutional committee. (Scheme 2)



Scheme 2 - Basic scheme of development and the process of virtual studio

4 EDUCATIONAL AND RESEARCH PROJECTS

Presented examples are various types of virtual studios applied to teaching and research process at the Department of Computer Aided Architectural Design, Institute of Design, Faculty of Architecture, Slovak University of Technology.

4.1 BRAGRALUWIE - International collaboration and design studio

As the initiative of the teachers from four different universities – Faculty of Design and Technology, University of Luton, U.K., Technische Universität, Graz & Technische Universität Wien, Austria and Faculty of Architecture, Slovak University of Technology, Bratislava, Slovakia several international design studios were created from 1995 till 1998.

"Projects had been successful in achieving completed design proposals at each participating institution. In educational terms the projects were benefitial in developing the awareness of the students on issues connected with collaborative working, differing architectural cultures and the potential of electronic communication in design. All the participants, particularly the teaching staff, learnt a great deal about the possibilities of using the Internet as a colaborative working tool." [Koščo, eCAADe 1999]

Scheme 3 : Virtual studio participating

4.2 Street of 21st Century - International competition and design studio

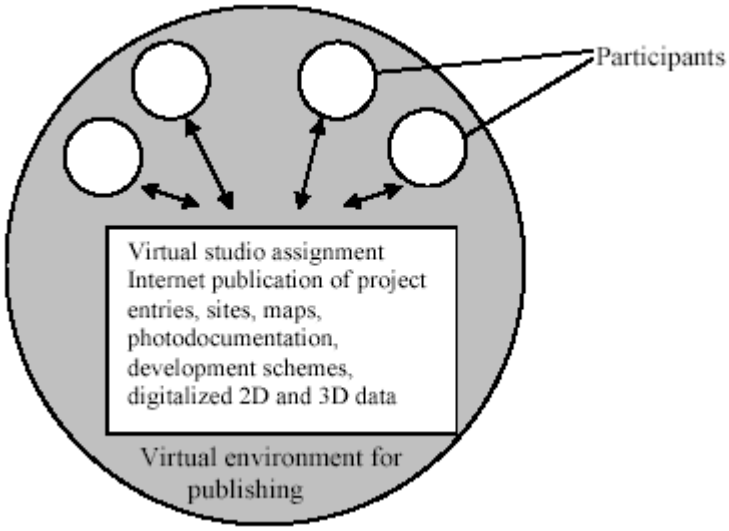
This study had been ellaborated in the scope of an international student competition in which the European Center for Architecture & Information Technologies - International Academy of Architecture in the cooperation with Bratislava City Council and the Faculty of Architecture specified the street (or better the whole district) to be designed for the 21st century requirements. The core aim had been to support the cooperation of talented students at European universities and to gather new, modern ideas for the participant cities redevelopment.

4.3 Bratislava Dockland Zone

Bratislava Dockland Zone had been a collaborative study focussed on the architectural re-development of the Danube dockland zone in Bratislava, using advanced computer based urban modelling and virtual cooperation through the Internet and digital communication technologies. It dealt with the area of old Bratislava port, which according to the model of urban renewal of old dockland area in London, was intended to promote urban re-development strategies in this area. The collaborative student design work and academic research between two universities, Bratislava and Luton (U.K.), was supposed to continue after the completion of this specific project. A core aim of the project was to achieve an impact upon urban renewal strategy and policy in both partner sites, and to participate in the formation of appropriate systems.The impact of the academic contribution in terms of student design projects was recorded through web based design presentations, end-of-year exhibitions and the reports of external examiners at the two participating institutions.

Fig.1. Web environment for Street of 21st Century and for Danube Docklands Zone

All these studies had the common methodological features. Basic informations about the projects, specific data entries, building regulations by the City council, site references and photodocumentation had been available on a server through hypertext organized web pages linked with other important sources. Two-dimmensional and three-dimensional vectorised models of the existing conditions of the designed areas had been created, published on Internet and able to download. Communication during the various stage of colaboration had been asynchronous, using e-mail, and synchronous, through ISDN videoconferencing. The result designs had been published at the web sites.



Scheme 4 – Common virtual studio assignment

Fig.2 : Aerial view of the site

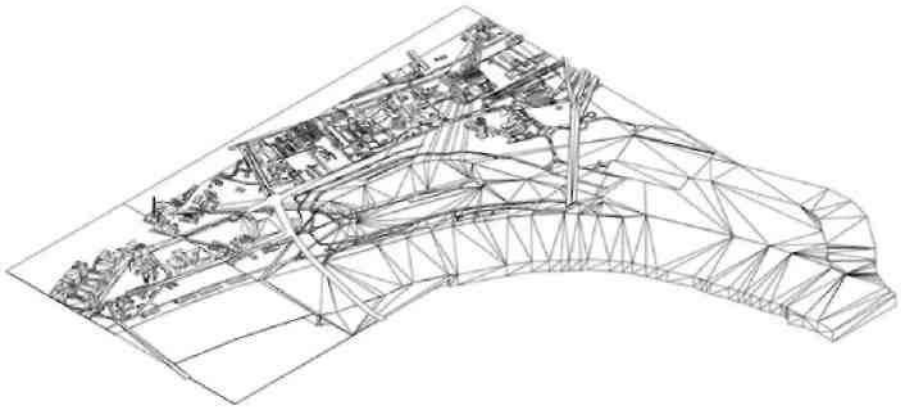


Fig.3 : 3D digital model of the area

Fig.4 : Photodocumentation

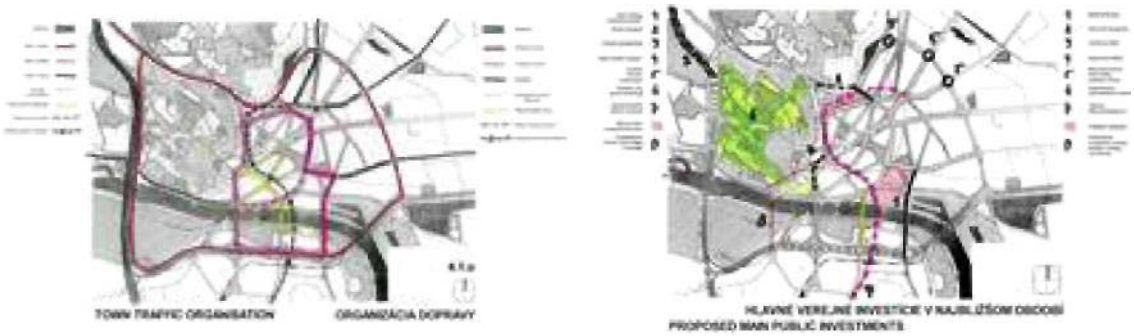


Fig.5 : Schemes, studies, regulations

Fig.6 : Videoconferencing through ISDN lines during the studio project consultation, Bratislava,SK Luton,U.K.

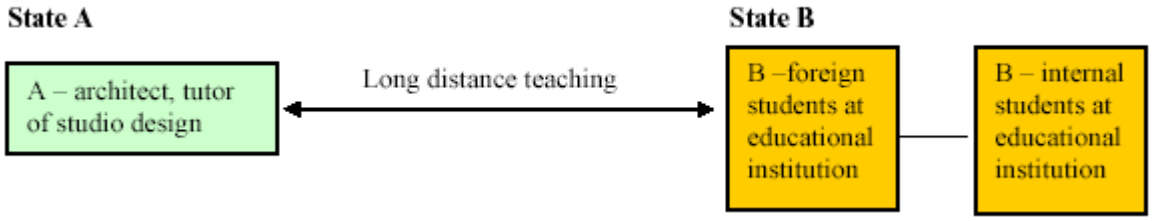
4.4 The Centre of Czech Architecture in Prague

This is an actual pedagogical experience with virtual collaboration between foreign students from Socrates–Erasmus mobility scheme, studying at the Faculty of Architecture, Slovak University of Technology,Bratislava and its professors, and american professor, Mr. Lizon, from University of Tenneessee, USA.The topic of the studio was the reconstruction and desing of the new spaces for Centre of Czech Architecture in Prague.

The combined face-to-face and long distance education has been used during the two terms of the studio works.The unique distant learning consisted from the initial, continuous and final intensive workshops at the Faculty and subsequent videoconferencing sessions and electronic communication between students in Bratislava and the teacher in the U.S.A. Graphic files of students ´ architectural design have been consulted through computer nets. For the long distance synchronous communication the systems of VRVS (Virtual Room Videoconferencing System) and Skype had been tested. Both systems belong to Internet videoconferences and require the minimum of technology equipment (web camera, headsets or microphone and loudspeakers) for long distant video, audio and data transfer. Final jury review has been realized

successfully at the the Faculty of Architecture, Slovak University of Technology,Bratislava with the jury chairman´s attendance trough the video-conference.

Fig.7 : Videoconferencing through VRVS system during the studio project consultation



Scheme 5 – Long distance studio teaching

5 METHODS OF VIRTUAL STUDIOS VERIFIED AT THE FACULTY OF ARCHITECTURE, SLOVAK UNIVERSITY OF TECHNOLOGY, BRATISLAVA

- **Studio assignment** can be accomplished either by the real attendance of the tutor or definitely virtually, if the project data are adjusted digitally and are accessible via computer nets and Internet.
- **Data transfer**. Frequent communication and the transfer of the partial design data, sketches, questions, comments, etc. are necessary for studio project correction and consultation during the various stages of creative proces. ‘
  Our realizations had shown, that distant teaching at these stages of studio project can be equally fruitful using simple ICT methods (e-mail, net data transfer, chat, skype, etc.) as the presence forms of studio teaching, if the consultations are frequent, regular and consequent and the students and professors have at least the basic computer knowledges.
- **Revision of elaboration** of studio projects is realized usually in the middle of the term as partial public presentation of student´s design before the fellows students and tutor. To keep the open form, the virtual studios use appropriate videoconferencing tools for long distance public presentation of the work. For the long distance synchronous communication has been verified videoconference systems :
- VRVS (Virtual Room Videoconferencing System) - belongs to Internet videoconferences and requires the minimum of technology equipment (web camera, headsets or microphone and loudspeakers). VRVS system is able to accomplish multipoint videoconference session and to adjust specific desktop as a sharing server for the presentation of digital work. Also the image transfer is satisfactory. Some problems have been caused by installation of the system to local PC stations of participants and by worse quality of sound transfer (sound echo).
- Skype - also belongs to Internet videoconferences and requires the minimum of technology equipment (web camera, headsets or microphone and loudspeakers). Skype provides good sound and video transfer and is very easy to manage. However, it did not allowed us the multipoint sessions and online digital data presentation, but the simplicity and user friendly environment of Skype caused its wider exploitation in the process of long distance teaching in virtual studios.

- ISDN (Integrated Services Digital Network) videoconference - is a circuit-switched telephone network system, designed to allow digital transmission of voice and data over ordinary telephone copper wires. It is relatively expensive from the point of view of the technology equipment (the special videoconference camera), and for running the sessions (telecomunication payments), but offers very good video and audio transfer. It could be realized just in case all distant participants have ISDN videoconference tools.
- Final studio project presentation is realized before the professional committee. The distant forms of virtual studios have used videoconference systems and results proved to be quite satisfied. Such forms offer to gather not only geographically distant students or tutors, but even geographically distant members of committee, without the necessity of traveling. The way of communication must be thoroughly agreed with all participants beforehand.

Fig. 9 : Recordings from final studio projects presentations, Bratislava,SK– Venice, U.S.A.

Fig. 10 : Recordings from final studio projects presentations, Bratislava,SK – Venice, U.S.A.

6 RESULTS

The valorisation of realised pedagogical and research projects, as well as the structured analysis of acquired experiences and results, may contribute the design of optimal digital environment and the model for realisation of the long distance education in architecture.

In general, the dual system, (the combination of face-to-face intensive workshops and the long distance education), can be considered as the most suitable and used model of long distance education in our experimental studies. The exception had been “The Street of 21st Century”, which, as the international competition, had been assigned explicitly through Internet without fixed pedagogic assistance. Every other experimental study had begun with the familiarisation of collaborative collectives, with the definition of problems and the approaches of their sollution, and afterwards the long distance education has been done. In that manner the human dimension has not been dropped from such form of education. The results of critical evaluation of realised pedagogical and research projects assign to at least equivalent effectiveness of studio projects, realized through the long distance ICT tools, the multinational and multiprofessional cultural outlook interchange is the added value.

The electronic communication technologies and multimedia offer wide opportunities for various supplements of traditional architectural education. They open the new methods for the cooperation, for the interchange of cultural values and knowledges and for the creative inspirations. Our experiences with the long distance education, design and research in architecture and urban design realized with the use of ICT technologies have shown the indisputable advantages, which concern mainly the:

- Overcomming the geographical, cultural and personal barriers
- Improvement of the availability of education materials and their reusability
- Increasing of computer literacy
- Improvement of the teaching technique
- Costs savings

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