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OIKODOMOS

a virtual campus to promote the study of dwelling in contemporary Europe

WORKPACKAGE **RES**

Comparative study of virtual and physical studios

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workpackage RES	Methodology and valorization of Virtual Design Studios
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This report reviews the WP activities including:

- the analysis on virtual education in architecture and urban design, in the scope of the Design Studios;
- the specification of Virtual Design Studios and the comparison of virtual and physical aspects in the Design Studio education;
- the valorization of realized VDS pedagogic models, identification of strong and weak points, opportunities and threats of their further development.

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1) Introduction

The study of architecture is a very specific intersection of engineering and artistic expression, thinking and feeling. Architecture belongs to the oldest professions in the cultural human history. Architectural education and training has progressed from the prevalent forms of apprenticeship to the forms of studio-based tutorial learning. Design Studio teaching is a simulation of design practice, with designer/client interactions over actual projects. The tutor´s authority strongly determines the design process. The tools of information and communication technologies (further ICT) can provide much help to the simulation of real, multiprofessional environment. They offer the possibilities reflecting the new techniques of education, research and practice. Networks and Internet give rise to a matrix of multiple interrelationships resulting from the exchanges among cultures, disciplines and pedagogic experiences. The Virtual Design Studio (further also VDS) was originated as the learning activity carrying out the design works in between the OIKODOMOS Joint Workshops. The implementation of the VDS enhances the quality of collaborative groupwork and makes possible the synchronous interventions on the common digital workspace due to the integrated ICT tools. It proposes to conceive the designs of distant projects elaborated simultaneously by students' teams and partners from other target groups located in different European regions. VDSs were partially incorporated in the existing learning programmes of partners universities, despite their actual relative heterogeneousness

1.1 Concept of the WP RES

Conducting a review and analysis on virtual education in architecture and urban design, especially in the scope of the Design Studios. Specification of Virtual Design Studios and the comparison of virtual and physical aspects in the Design Studio education. Implementation of the conclusions both to the design of the collaborative VDS platform and to the project´s learning activities. Valorization of realized VDS pedagogic models, identification of strong and weak points, opportunities and threats of their further development. Evaluation – comparison of virtual and physical studios in the learning activities around Bratislava workshop.

1.2 The work flow of the WP RES

Analyses of the past experiences in the VDS applications, together with the experiences from the Pilot Study, carried out between two project partners, FASTU Bratislava and IUG Grenoble, the WP leader identified possible VDS scenarios, which could be applied in the OIKODOMOS Virtual Campus. In parallel, the methodology and draft plan of the collaborative environment for VDS design was suggested. It was gradually applied for common learning activities during the project and retroactively evaluated and enhanced (Figure 1.).

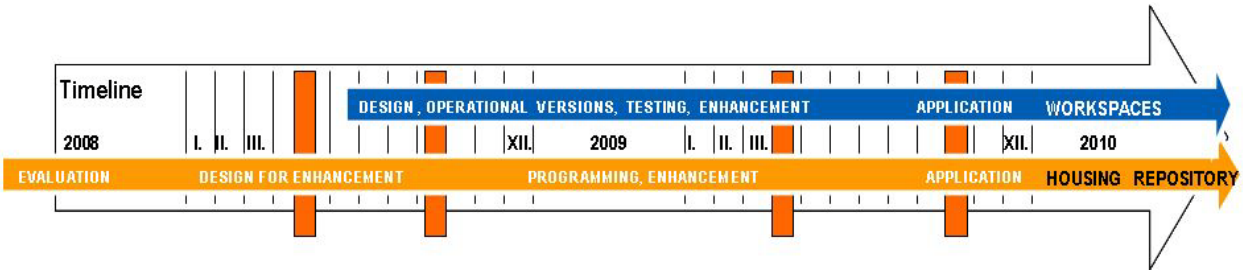


Figure 1: Process of the development and implementation of OIKODOMOS Virtual Campus collaborative environments.

Reduced application of the VDS between project partners due to the differences in the study programmes and subject types involved in participating institutions, caused unbalanced participation of partners teams in common design studios. Late onset of VDSs – which were partially applied in Grenoble and more complex in Bratislava workshops - induced the continuation of WP works

practically till the end of the project. The VDS module functionalities were continually evaluated after teaching blocks around each of the OIKODOMOS workshops in Ghent, Grenoble and Bratislava. Implicit experiences were treated in the conceptual enhancement of the Workspaces environment as well as in the VDS learning approaches. The comparison was carried out for the final workshop learning activities, for the rest it was recompensed by the SWOT evaluation of each design studio related to the OIKODOMOS workshops. Verification of the Virtual Campus methods in adults was bounded to the involvement of the local administrative and institutional staff.

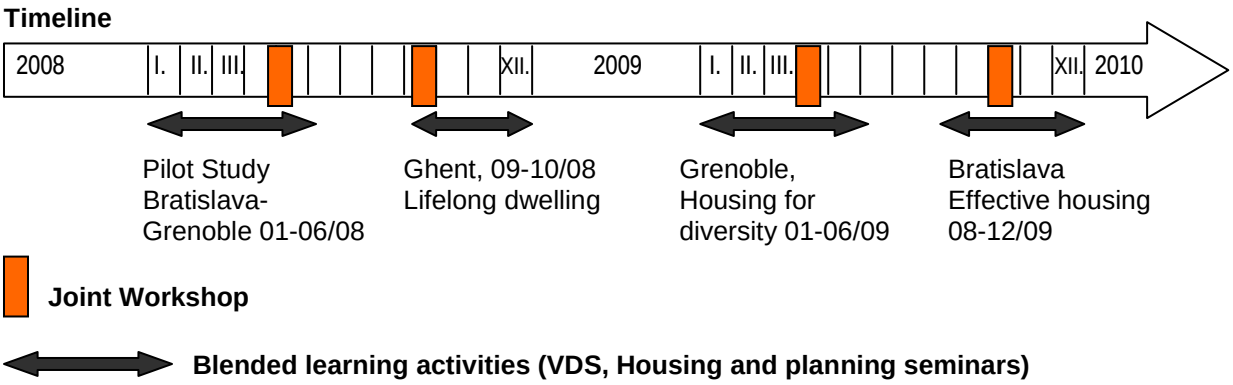


Figure 2: Timeline with realized common learning activities and VDSs in the Virtual Campus.

In line with the project developing pedagogic framework the workpackage RES contributed to the specification of the learning outcomes relevant for the VDS activities, identified the comparative indicators for the usability evaluation and employed the SWOT approach for the evaluation of realized learning activities. The workpackage activities were closely interconnected with other workpackages, especially with PR EP4 (Enhancement of web based learning environment and implementation of a virtual studio module), PR EP5 (Design of joint curricula for virtual campus) and PR EA2 (Implementation of learning programme: Housing design studios). The works done within this WP collaborated with the WP QLPN (Evaluation of results and project´s impact in life-long learning education) in the evaluation process and the design of the questionnaires, with the objective to assess the impact of the virtual environment on the teaching and learning methods in architectural design.

The final report summarizes the workpackage work and attained findings in following segmentation:

- Analyses of Virtual Design Studio
- Implementation of the VDS in the OIKODOMOS Virtual Campus
- Evaluation of implemented collaborative learning activities and VDSs

2) Analyses of Virtual Design Studio

2.1 Specification of Virtual Design Studio

Virtual Design Studio represents the reflection of the architectural education on the challenges of new ICT and the contribution to simulation of architectural practice. VDS can be realized with the different combinations of distant and local participants (institutions, tutors, students, experts, citizens, public administration) cooperating at the local or remote sites. VDS enables long distance collaborative studio work, the location of participants is not of so importance as the way of sharing the knowledge, data and learning approaches. A VDS therefore has to scope explicitly by the ways of knowledge, data and learning&teaching management.

2.1.1 Management of knowledge

Knowledge sharing and management is undoubtedly the biggest challenge of the VDS applications. It represents the process of knowledge codification procedures, ”which convey the transformation from tacit (subjective, individual) into explicit (codified, formally expressed, systematic, articulated) knowledge.”[1] Within a traditional design studio this process of transformation is limited to the communication teacher/student and student/student within the class: the teacher delivers his or her experience through personal contact by commenting students' designs which are also subjected to the scrutiny of other students in the open debates. In the model of VDS learning environment the explicit knowledge can be formulated through the developed system of achieved learning outcomes during the different stages of VDS.

2.1.2 Management of data

Face-to-face or present Design Studios need no sophisticated system for data management. On the contrary, within the Virtual Design Studios the data management is crucial. It enables the long distance accessibility of the details of remote sites, enables the deliveries of student works during the various stages of VDS and enables afterwards the commenting and evaluations. Finally, data management can solve the preservation of the design works, lectures and presentations of the design topic or design site, which can be frequently re-used.

2.1.3 Learning&Teaching management

All necessary teacher/student and student/student communication of the present Design Studios are solved within the class. The teacher delivers his or her experience through personal contact by commenting students' designs which are also subjected to the scrutiny of other students in the open debates.
For the successful design process of the VDS carried out collaboratively, participating partners need to discuss explicitly the workplan of the Design Studio development: timetable, programme, design stages, learning outcomes and evaluations. At the outset, teachers have to agree on the learning outcomes associated with learning activities to be conducted in the Design Studio.

Groupware is a technology designed to facilitate the work of groups for communication, cooperation, solving the tasks and for evaluation. In general there can be distinguished asynchronous and synchronous types of groupware communication management.

To asynchronous groupware belongs: e-mail, mailing list, workflow systems, news, calendar, timeline, collaborative writing systems, hypertext, forum and blogs.

To synchronous groupware belongs: video communication systems, chat systems, decision support systems, shared desktops, applications, presentations, whiteboard, collaborative drawing/designing/ reviewing systems...

2.2 Differentiation of the Virtual Design Studios

2.2.1 The basic components of the VDS

A Design Studio –traditional or virtual– consists of three main components (Table 1.): a design theme, a site for the project and the methods of teaching/learning and knowledge creation. In a traditional design studio –constrained to a physical location– these three elements are treated as a unity. In the context of a VDS, however, these three elements –replicated by the number of instances of the Design Studio located at the participating schools– give rise to a matrix of multiple interrelationships resulting

[1] Devetakovic Radojevic, M. (2007) Codification of Site Related Knowledge in Virtual Design Studios. In Design Studio Pedagogy, Horizons for the Future, A. M. Salama and N. Wilkinson (editors), pp.325-341.

from the exchanges among cultures, disciplines and pedagogic experiences.

The theme for Design Studio (e.g. Design for all, Housing for diversity, Effective housing,...) can be common or individual. Common theme can support the multicultural knowledge sharing between partners, explicitly expressed for example by lectures, or by common tasks solved by students.

The Design Studio site or locality can be as well common for all participating partners, or individual, local. Common design sites can be further distinguished as specific, located at specific geographic place, or universal, empirical localization can be used. Common design site can contribute to the multicultural knowledge exchange, the exchange of the pedagogic approaches, it can support the long distance collaboration of the students, enhance the competitiveness and the possibility of comparison of the results. Specific localization of the design site fosters the generation of spatial referenced knowledge. Specific locality is often appointed with the cooperation of local governments, local or city councils. This important aspect brings architectural education nearer to the requirements of practice. Structured, topic or site oriented research and design, supports the informal education of other possible participants interested in the design issue, outside the actual partnership.

The teaching & learning process of the Design Studio can imply exclusively present forms (in traditional Design Studios) or can combine on-line and off-line learning activities, carried out collaboratively in synchronous or asynchronous ways using different ICT tools. The later is the most employed model in the VDS. In some circumstances the exclusively distant teaching is applied in the VDSs, when the teacher (or well-known architect) is geographically distant from students.

Combination (Table 1.) of the individual Design Studio theme, individual solved sites and the present, face-to-face teaching represents the traditional classroom studio teaching in architectural education and offers not much space for sharing the knowledge, data or communication. Every other combination creates the possible scenario for the VDS. Some of them has been applied, tested and evaluated within the OIKODOMOS Virtual Campus.

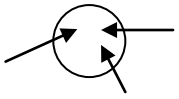
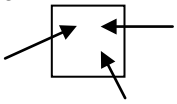
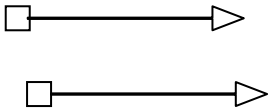
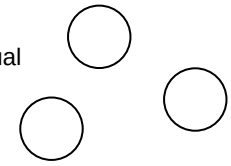
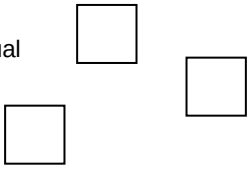
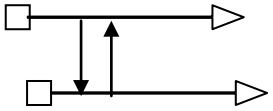
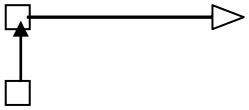
<table>
<tr><th>A.Theme, topic</th><th colspan="2">B.Site</th><th>C.Teaching/Learning</th></tr>
<tr><td>1.Common  </td><td rowspan="2">1.Common  </td><td>1.a.Local, specific</td><td rowspan="2"> 
1.Present, face-to-face</td></tr>
<tr><td>1.b.Universal, empirical</td></tr>
<tr><td>2.Individual  </td><td colspan="2">2.Individual  </td><td> 
2.Combined</td></tr>
<tr><td></td><td colspan="2"></td><td> 
3.Distant, online</td></tr>
</table>

Table 1: Specification of the main components of the Design Studio.

2.2.2 Basic phases of the VDS

The implementations of the project based collaborative learning approach required the identification of basic realization phases of Design Studio. For the virtual, long distance appointment of the collaborative design work the essential is the preparatory or initialization phase of VDS, which is in the responsibility of initiatory partner(s). They have to prepare project details in adequate range in order to involve distant partners teams and which enable them to understand the distant locality.

Basic phases of the VDS:

1. Preparatory or initialization phase - pertains mainly to the competence of the teacher, who should select the site, prepare the details, institute the programme of the Design Studio;
2. Realization phase, where five stages can be discerned:
    a. Perception– where students have to acknowledge the site and assignment specification;
    b. Analyses– with the bibliography research on the topic and the analyses of actual conditions, natural sources (landscape, climate, topography, ecosystems, water, greenery,…) and cultural sources (existing architecture, traditions, social patterns, implementation to neighborhood structures,…);
    c. Conceptualization – with the creative synthesis of knowledge acquired by the research of related sources and the site/ building environment conditions. This is the main creative and brainstorming stage of the design. Tutors should encourage the creative process by permanent and competent interventions and feedback;
    d. Finalization – process of integration of all dimensions and parts of design and application of adequate design techniques;
    e. Presentation – final habilitation of the completed Design Studio before the expert jury, tutors, peer students;
3. Summarization phase, where participants evaluate the achievements of the collaborative Design Studio and publish/store/ disseminate the results.

3) Implementation of the VDS in the OIKODOMOS Virtual Campus

During the two-year project activities, each semester a design project has been proposed in conjunction with a housing topic. The projects were usually located in the region of school which hosted a Joint Workshop. They were developed during one semester in blended Design Studios taking place both in the virtual space and in the participating schools.

3.1 Pilot Study Bratislava-Grenoble

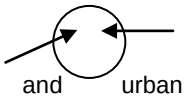
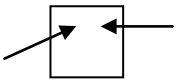
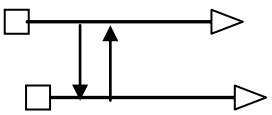
A. Theme, topic	B. Site	C. Teaching
1.Common  „Strategic and urban development for selected area“	1.Common - Local „Bratislava – development zones“, specified with the city council Bratislava) 	2.Combined  Partners: FASTU/ IUG

Table 2: Specification of the VDS in the Pilot Study.

3.1.1 Objectives

In order to check the feasibility conditions and transposition of the Virtual Design Studio into OKODOMOS partners' learning programmes, University of Grenoble and University of Bratislava, who didn't participate in the previous programme HOUSING@21.EU, organized a test itinerary for the

VDS. The activity of this pilot Design Studio (Pilot Study), which involved students from both universities allowed the evaluation of requested compatibility with existing learning programme and test the ICT asynchronous and synchronous communication protocols. The studio experienced the participation of non-academic target groups on the supervision and students' projects tutoring. An ad-hoc created website dedicated to the collaborative groupwork permitted to test some specifications for adequate organization and tools used by the future common Virtual Design Studio.

3.1.2 Participants

IUG Grenoble - 1st year of Master Study, Design Studio on spatial and strategy Housing planning, (37 students/ 4 teachers), FASTU Bratislava – 3rd year of Bachelor Study, small Urban Design Studio (12 students/ 2 teachers).

3.1.3 Learning activities

Activities of the Pilot Study have been organized as a „virtual" distant collaborative group work (February-April 2008), followed by a „real" on-site project workshop (May 2008). Two groups of French and Slovak students worked together on three selected sites, which confronted the issues of housing in urban development strategies in Bratislava metropolitan region and in cross-border development urban zone between Slovakia, Austria and Hungary.

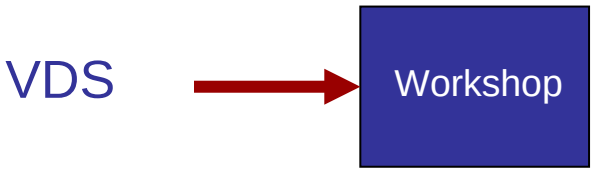


Figure 3: VDS implementation in the Pilot Study Bratislava – Grenoble

Pre-workshop Learning Activities:

The choice of sites for studio projects and the definition of relevant issues to be solved have been selected in coordination with Bratislava local authorities. A first videoconference between Grenoble and Bratislava in February 2008 presented each selected site and main orientations for project works. During two months of studio work, students have been tutored by home university academics and discussed via regular videoconferences with teachers from partner's university. The practitioners, architects and planners integrated the studio as external tutors. Students collected information and data related to the selected case studies via Internet and file sharing, elaborated diagnosis and developed draft projects for each site. They uploaded the information on a specific collaborative website created and located in Grenoble server (http://webtek-02.upmf-grenoble.fr/). This site was conceived also for storing complex data of the site (e.g.maps, plans, photos, statistics, legal regulations,...) in addition to diverse annex documentations, thematic readings and references, accessible for students and tutors.

Workshop Learning Activities (May 12th – 19th 2008):

In May 2008, students and teachers from IUG Grenoble organized a 10 days field trip to Bratislava in order to finalize virtual projects elaborated on distant mode and confront them to the reality of the locality. They presented drafts of the projects to Bratislava Municipality representatives, FA-STU teachers and students. During one week student worked together with their local colleagues to complete the project design and to make a final presentation by PowerPoint slideshows and poster exhibition. After returning home, students exposed the same OIKODOMOS projects exhibition in IUG building in Grenoble.

3.1.4 Evaluation

Strong points:

- Assignment had close connection with the requirements of practice, involved was local administration - City council Bratislava and planning experts;
- Students and teachers had to apply ICT for long distance VDS work and communication, process thus facilitated the acquiring or improving learning outcomes and competences (in ICT, language, international communication and presentation).

Weak points:

- Only bilateral application of the Pilot Study (IUG Grenoble-FASTU Bratislava);
- Differences in crediting, timetables, subjects´ regulations of participating institutions, which caused unbalanced participation of partners teams.

3.2 Workshop Ghent, Lifelong dwelling – One side of sustainability

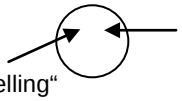
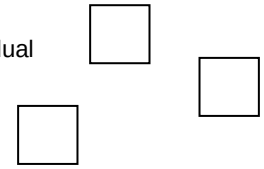
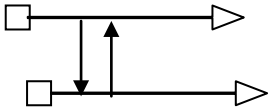
A.Theme, topic	B.Site	C.Teaching
1.Common „Lifelong dwelling“ 	2.Individual 	2.Combined  Partners: SintLucas/URL/FASTU/ IUG

Table 3: Specification of the VDS of the Workshop Ghent.

3.2.1 Objectives

The first OIKODOMOS Joint Workshop focused on different ways of developing sustainable housing (in new or existing structures, communal and individual housing). Life-long living as structural element for new housing for young people (affordable and accessible for all), redefinition and redesigning of existing houses and housing blocks in sustainable ways (economic, social and ecological) for young people, elderly and people requiring help - these items were developed in Design Studios and theoretical papers which contributed to the conceptual thinking regarding housing on a European level.

3.2.2 Participants

URL Barcelona (5 students/ 2 teachers) and SintLucas Ghent (12/4) – Seminars on Housing study, IUG Grenoble (5/3) – Spatial and strategy housing planning, FASTU Bratislava (5 / 2) – Design Studio and Seminar on Residential housing.

3.2.3 Learning activities

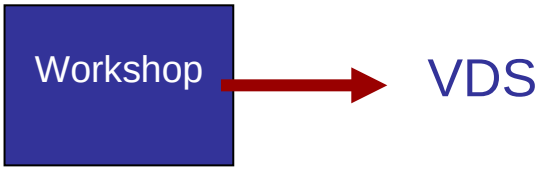


Figure 4: VDS implementation in the Workshop Ghent.

Pre-workshop Learning Activities:
Research of the theme individually at partners schools to get an understanding of the complexity of the issue and to be able to present it at the international forum. Documentation of the sustainability at the selected example of contemporary housing architecture.

Workshop Learning Activities (September 29th – October 3rd 2008):
The aim of the first workshop was to formulate the characteristics for contemporary housing, from a European perspective. Mixed students groups prepared firstly the analyses on urban sustainability of their selected everyday environment. Subsequently they elaborated group design exercise and prepared the presentations. Based on this survey, elaborated during the workshop, students continued exploring the different issues further during courses and seminars taking place at their own institutions.

After-workshop Learning Activities:
International groups had to join distantly and elaborate their final presentations and essays together. Their works were uploaded to the prepared Workspaces environment and were evaluated by teachers and commented by other students.

3.2.4 Evaluation

Strong points:

- Process facilitated the acquiring or improving learning outcomes and competences in the topic of international view on the housing design for all, managing the ICT and language, international communication and presentation;
- Process facilitated the critical thinking of students by executing international and interdisciplinary peer evaluations.

Weak points:

- The programme before, during and after workshop was not sufficiently defined;
- Low social interactions were established, they could be improved by on-line activities before and after the workshop;
- For the time shortage the final groupwork designs and presentations were without the interactions between students, without critique from teachers and other practitioners;
- Low VDS testing between partners (only the common theme was applied, partners had different subject types and individual design localities).

3.3 Workshop Grenoble, Housing for diversity

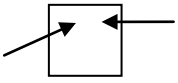
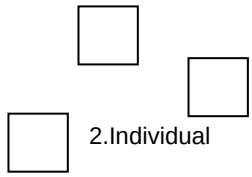
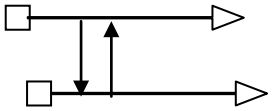
A.Theme, topic	**B.Site**	**C.Teaching**
1.Common „Housing diversity“ 	1.Common during workshop  „Giant Grenoble“  2.Individual	2.Combined  Partners: IUG/FASTU/ SintLucas/URL

Table 4.: Specification of the VDS in the Workshop Grenoble.

3.3.1 Objectives

The activity carried out during the workshop Grenoble capitalized students works prepared in their home universities and information exchanged via the OIKODOMOS Workspaces website. Learning tasks were focused on the development scenarios, proposals and critiques related to the contemporary approach of housing projects and urban development strategies. Grenoble scientific peninsula district (Giant) offered an interesting context to confront these housing concepts and development proposals to a real site. IUG Grenoble team developed the organization, tasks, outcomes and a time schedule for the workshop. Many complementary lectures and activities were prepared by participating universities and local partners to deepen and intensify the knowledge about the central topic: „Housing for diversity and sustainable neighborhoods“.

3.3.2 Participants

URL Barcelona (6 students / 3 teachers) - Seminars on Housing study, SintLucas Ghent (5 / 1) - Design Studio and Seminar on Residential housing, IUG Grenoble (12 / 4) – Spatial and strategy housing planning, FASTU Bratislava (9 / 3) – Design Studio and Seminar on Residential housing.

3.3.3 Learning activities

Figure 5: VDS implementation in the Workshop Grenoble.

Pre-workshop Learning Activities:
Site analyses were done individually by partners schools with the synchronous and asynchronous distant help provided by IUG team. Participants used the materials uploaded, consulted and completed it on the OIKODOMOS Workspaces website during the preparation phase (February-April). Urban development strategies were communicated online by videoconference tools.

Workshop Learning Activities (April 22nd – 29th, 2009):
During the studio groupwork students had to propose an urban development design related to the Grenoble Giant site. They selected from the scenarios, proposed by IUG students and summarized critical reflections over the Giant site, integrated a part of their local activities and synthesized all in a common design, which included urban and architectural dimensions. Final outputs were presented in public, with the participation of teachers, students, elected people and other professional or non professional audience.

After-workshop Learning Activities:
The workshop results were evaluated in common between all partners. Design works or seminar tasks continued at partner schools according to their usual schedule. Final presentations of designs with the teachers´ critiques between URL and FASTU were realized online (using Skype and TeamViewer tools).

3.3.4 Evaluation

Strong points:

- Process strongly facilitated the interdisciplinary exchanges - the added value was the capacity to share the wider context view (including socio-economic, regulatory or spatial problems) by students, teachers and other participants, mutual openness, and precisely the competence to contribute to solve complex, real situations.
- Process facilitated the association of other partners to project activities. The perspective of leaving the strict academic circle and associate professionals, politicians, citizens is crucial.
- Workshop presentations and collaborative environments (Workspaces, Case Study Repository) provided a promising start in the integration of external stakeholders for completing the OIKODOMOS designs, lectures and presentations, or providing the tutoring, though it is still difficult (e.g.because of language or time insufficiency).

Weak points:

- Ongoing difficulties with harmonization of academic calendars, differences in programmes and study contents between partners;
- Collaboration was restricted by the lack of information about partners learning activities during the semester and their integration with the workshop activities;
- Too much space for lectures during the workshop and less space for studio groupworks;
- Missing distant communication tools in provided platforms were recompensed by external tools (like GoogleGoups, Facebook,…).

3.4 Workshop Bratislava, Effective housing

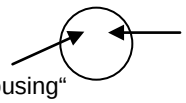
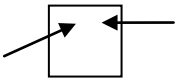
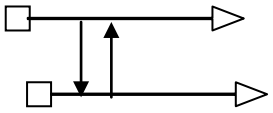
A.Theme, topic	**B.Site**	**C.Teaching**
1.Common „Effective housing“ 	1.Common (all partners, whole semester)  „Bratislava, Dubravka – Big Camp“	2.Combined  Partners: FASTU//URL/ SintLucas/ IUG

Table 5.: Specification of the VDS in the Workshop Bratislava.

3.4.1 Objectives

The third OIKODOMOS workshop in Bratislava and relevant learning activities during the last semester of the project life applied the most complete collaborative Design Studio. It was focused on the effective urban and housing development in the suburban part of Bratislava. Partners built on the previous experiences and evaluations of realized learning activities. Preparatory activities started already during the previous term with the selection and specification of the design theme and the design site. Preparation of common learning activities prior to the start of the semester proved to be inevitable for their successful application within the regular study curriculum of partners. It resulted in the specification of common learning activities, task sequencing and the definition of corresponding learning outcomes. The site has been selected in close cooperation with local administration, to achieve the involvement of local government, experts, practitioners and citizens. Localization and the size of the proposed locality was chosen to include the interests of all project partners with various scope of design, including Spatial and strategy planning, architectural and urban Design Studios and Housing seminars. The Workspaces environment for the asynchronous learning activities connected to the design tasks was enhanced and fully available. For the first time project experienced common design theme together with common distant locality for all partners during the whole semester.

3.4.2 Participants

URL Barcelona (8 students/ 2 teachers) - Seminar on Housing study, SintLucas Ghent (5/ 3) - Design Studio and Seminar on Residential housing, IUG Grenoble (12/ 4) – Spatial and strategy housing planning, FASTU Bratislava (12/ 9) – Design Studio and Seminar on Residential housing.

3.4.3 Learning activities

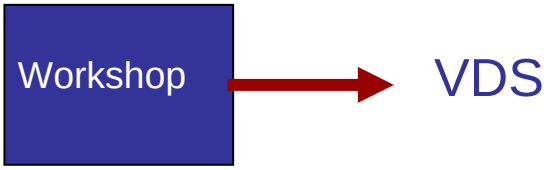


Figure 6: VDS implementation in the Workshop Bratislava

Pre-workshop Learning Activities:
The host partner –Bratislava Faculty of Architecture– prepared the site analyses and description of the development program and made them available for distant partners through the Workspaces environment. Participating teams were able to discuss the design issues -e.g. program requirements, site conditions- via videoconference using Skype for audio/video links in conjunction with Teamviewer for the shared presentations. Additionally, professional broadcasting was provided by a scientific television crew and streamed online to be accessed via a specified web link.

Videoconference presentation of the Big Camp Dúbravka locality for distant partners.

From the outset, the specification of common learning activities, the sequence of tasks and the definition of corresponding learning outcomes, were essential to establish a base for the collaboration among partner schools sharing a learning Workspace dedicated to the workshop theme. Six learning activities were identified to be developed during the semester: from Perception and data mining, through Urban Analyses, Urban Concepts, to Architectural Analyses, Architectural Concepts and Final presentations.

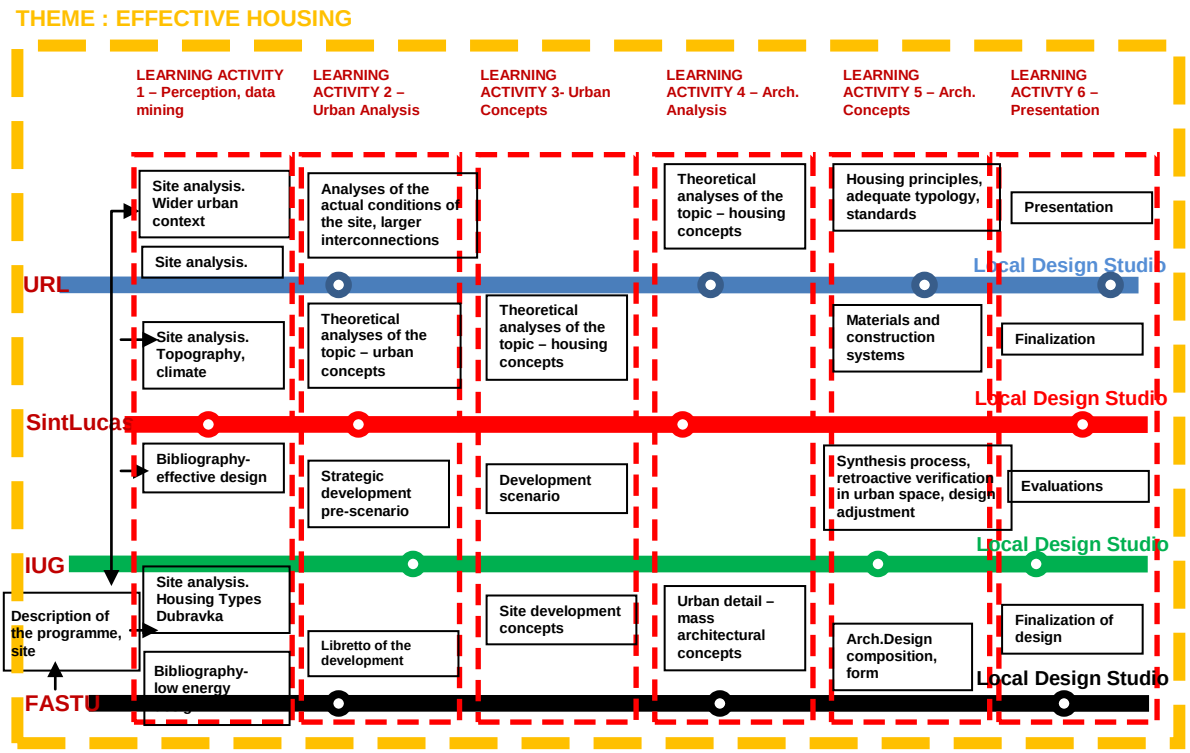


Figure 7: Proposal of the learning activities and tasks during the preparatory stage.

Effective housing design was proposed as the common design theme. An "effective housing design" stands for a creative design which respects the principles of sustainable development in a specific natural, cultural and social environment, and which reasonably utilizes natural sources, human knowledge and available technologies with the main objective of creating optimal living environments. Satisfying all of these requirements represents a permanent and open challenge for architects and planners, and it is nowadays a matter of debate in professional circles. Effective housing can create an environment humane to its users and society. The terminology of effective housing design, however, has not been very much explored. Therefore, research into the topic of effective design was one of the tasks included in the preparatory learning activities. In parallel, students formulated their visions for the development scenarios of the proposed site. OIKODOMOS Workspaces was the collaborative learning environment where these pre-workshop activities were carried out.

Workshop Learning Activities (October 14th – 20th, 2009):

At the beginning of the workshop, students from each of the four participating institutions presented a summary of the work done at their school during the preparatory phase. The group had to first to discuss the collective work done at their school, bringing out the most important ideas and to present them in a concise and effective manner to the workshop participants. The goal of the learning activity carried out in the Joint Workshop was to develop urban concepts for the proposed site. Seven mixed international student groups were to develop a concept for the Big Camp area supporting the idea of self-sufficient residence, with mixed functions of living, amenities, working, sports and free time activities. The results were presented and commented during the final presentation with the participation of local council representatives. Video of the event was streamed online through the web link to "shadow" participants of the workshop – the students from partners institutions, who had stayed at home. The outcomes produced by students were a contribution to the future urban study in the area.

After-workshop Learning Activities:

Learning activities continued after the workshop distantly, exploiting the OIKODOMOS Workspaces for asynchronous collaboration and videoconferencing for synchronous learning activities. As each partner school followed their own learning activities, new tasks were formulated and connected in

sequences. Along this process, the outcomes produced by students at one school became inputs for a task developed by another school. Thus, for example, they were asked to comment the works developed by their peers or to integrate in their projects some significant issues identified in the projects from other students. Online distant critique was applied during the final presentations (URL – FASTU).

3.4.4 Evaluation

Strong points:

- Process strongly facilitated the interdisciplinary exchange (urban, architectural design) and the association of other partners to project activities (Local council, professionals, citizens);
- Early start of the initiation phase enabled to integrate more partners – teachers, students at particular partners´ institutions as well as the more complex integration of partners to proposed VDS activities in the project life;
- Localization and the size of the proposed locality was chosen to include the interests of all project partners with various scope of design, including Spatial and strategy planning, architectural and urban Design Studios and Housing seminars;
- For the first time the VDS experienced common design theme together with common distant locality for all partners during the whole semester.

Weak points:

- The potential to develop a shared understanding around the theme and common locality has not been fully exploited in VDS, mainly due to time shortage;
- More laborious work for teachers and students. Unequal participation of partners - most teachers or students have to combine this virtual adventure with their “main” academic projects.

4) Evaluation

4.1 Methodology

The process of the evaluation of the VDS includes:

- Usability evaluation;
- Comparison of alternative solutions – the most important is to compare the VDS and the traditional forms of Design Studio, using the set of indicators and users survey for the comparison;
- Assessment of the system efficiency and user satisfaction.

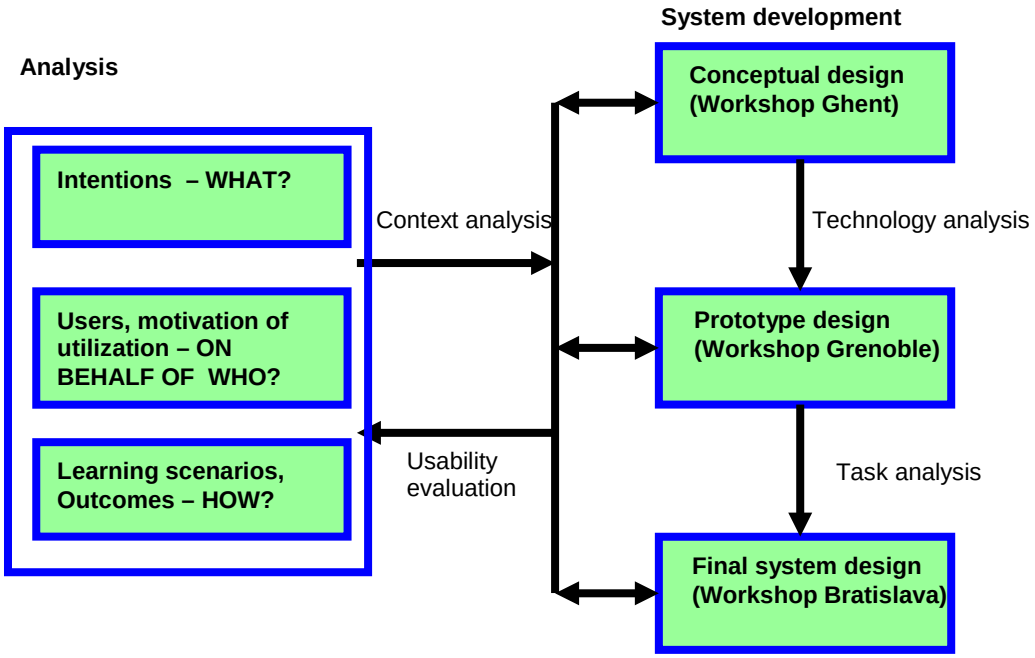


Figure 8: Concept of the OIKODOMOS VDS platform development and evaluation process.

Figure 8 shows the basic principles of the development of VDS collaborative platform in Virtual Campus, where should be firstly answered the general questions: “What we are going to develop?”, “Who will be the users?” and “How can the system support the teaching & learning management?”.

4.1.1 VDS intentions

The VDS was originated with the intention to create the collaborative environment for on-line and off-line learning activities carrying out the design works during and in between the Joint Workshops.

4.1.2 Target users

Target users of the VDS can be differentiated to direct users, primary involved in the learning activities:

- learning institutions;
- students (of all levels: Bachelor, Master, Postgraduate, LLP);
- teachers.

and other possible users, who can be involved in the VDS learning activities:

- adult learners;
- local and regional authorities, city councils;
- professionals (architects, urban planners, designers, experts);
- citizens, users.

4.1.3 Identification of the indicators for the VDS evaluation

Type	Description
Educational	Support of the traditional learning methods and acquiring new learning approaches; Support for peer review processes Knowledge of other cultures and diversity of disciplines; Gain the learning outcomes and competences; Integration of political and social visions.
Professional	Connection with practice - learners confront elected officials, residents, adapt the dialogue; Work in the multinational and multiprofessional environment, teamwork; Confrontation of learners skills in the same project, from the regional context and urban area scale to the building scale; Demonstration of composition and urban/architectural design ability; Having a global vision.
Institutional	Integration of the VDS to the educational curriculum of the institution; ECTS crediting Open University – acquisition of international learners; Involvement of adult learners and others; Productivity and the workflow of education.
Technological	Adaptability/ Interoperability/ User friendliness; Inclusion/ Openness/ Attractiveness; Exploitation of different representation and communication techniques; Involvement of the remote participants and the public; Support educational design requirements.

Table 6: Identification of VDS indicators.

4.1.4 Usability evaluation

Usability addresses the relationship between the used tools and their users. User has to be able to employ the tools effectively to accomplish his/her tasks. Usability of the system is the quality that makes it easy to learn, to use, to remember, error tolerant and subjectively user-friendly.
From an institutional aspect it is considered whether the use of the system can increase the productivity of the workflow, or gain more users (learners, teachers, others) and complement the traditional learning methods.

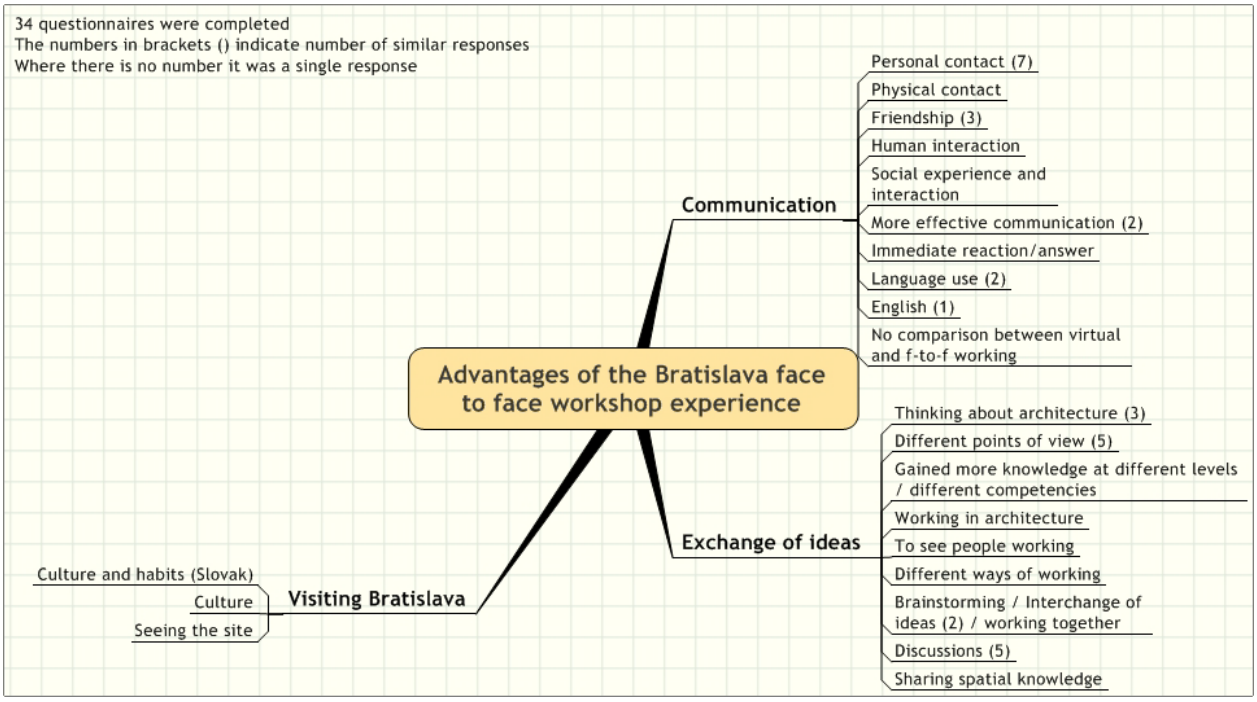
From the user aspect (learners, teachers) it is considered if the system can supports them to attain the defined learning outcomes and allows them to perform the tasks accurately and completely with enjoying the process.

4.2 Summarized evaluation of realized VDSs and common learning activities within the OIKODOMOS Virtual Campus

4.2.1 Evaluation – comparison of virtual and physical studios in the learning activities around Bratislava workshop

The third OIKODOMOS workshop in Bratislava and relevant learning activities during the last semester of the project life resulted in the most complete collaborative Design Studio. For the first time during the project all partners followed a common design theme and focused on the same Bratislava locality, Big Camp, during the whole semester. Four partner teams used the VDS methods before and after the workshop with reduced teams participating in the physical design studio during the workshop. All questionnaires and further details of the evaluation are in the QPLN work package report.

At the end of the workshop students participating completed a Likert evaluation questionnaire with four scale points plus Not Applicable options, and open comment boxes. This was the same as the evaluation questionnaire used for the previous (Grenoble) workshop but with an additional question to explore students feelings about working face-to-face compared with working virtually. Student's responses to this question are summarized in the mind map below:



Clearly the physical presence of fellow students (and teachers) and the communication opportunities afforded are felt to be important. Discussion of ideas within and across disciplines is also valued, and it's likely the workshop and intensity of the work acted as a catalyst for those discussions. Two students also recorded the value of experiencing the culture of Bratislava, but anecdotally many more also appreciated this aspect. It seems surprising that only one response recorded the value of seeing the site.

A further questionnaire was used to evaluate students retrospective view of the final workshop and their learning and teaching experiences pre and post workshop. This used the same scale points as the earlier questionnaire, but in addition to the Not Applicable included a Don't Know option, along with the open comment boxes. This was distributed to all participants in the Bratislava workshop, including those who had not participated in person. As the number of responses from each cohort was small analysis has been based on descriptive statistics and visual identification of any trends in the data.

The questionnaire was designed to allow separation of the response of those present in Bratislava from those not present. There was no difference between Median (mid value) and Mode(most frequently occurring value) scores for these two groups and all the scores were Strongly Agree or Agree. Questions with comments which would have been expected to demonstrate sensitivity to not participating in the workshop are given below, only the last comment listed is from a face-to-face participant.

Q.No	Mode	Question	Comment
29	1	In-school activities have been integrated and/or continue the activities begun during the Bratislava workshop	We had more assignments on the topic, but they were isolated from the rest of the program.
30	1	I use the OIKODOMOS Workspace regularly to complete learning activities continuing after the Bratislava workshop.	
31	2	The learning process, including use of the OIKODOMOS Workspace, has encouraged analysis of the connections between social, economical, technological aspects and the urban-architectural concepts.	After the workshop we had two more assignments to submit on the topic. I used the workspace to get information about the outcomes of the workshop, since I couldn't travel to Bratislava.
32	1	Working online collaboratively with foreign partners has been a good experience.	Working with foreign students was very interesting experience, I could find out what is their opinion.
32			I don't think the exchange objective was reached, except, maybe, during the workshop itself.
32			there were not so many collaborative works with other universities, the problem should be my absence in Bratislava, too
32		**Participant in Joint Workshop**	There was very few online collaborative work. The meeting in Bratislava was a very interesting experience.

The response to Q29 could be symptomatic of not feeling so connected with overall process, whilst that for 31 reveals a willingness to engage with the information available within the environments. The comments to 32 show a mixed reaction to working at a distance, the last illustrating a pattern of f-to-f participants making less favorable comments about the distant experience.

The results to question 41 had the greatest range of scores for both those present and not present, results and the single comment given below.

Q.41 - Using the workspaces suits my way of working.		
Mode	**Median**	**Not present (Virtual)**
2	2	
		Present
3	3	I found it a little bit complicated.

This is the only question in the set which has scores of disagree, and again raises the question of why the difference? Is it a function of disappointment following a face-to-face experience.

Students responses to questions concerned with the use of the workspaces provide more information. Some of the responses are off topic, possibly illustrating some of the difficulties of using English as the common language.

43. What do you like, what is done well in the Workspaces?
I really like the contents of the tasks, which are very actual. The clearer comprehension of the housing and its forms.
Cooperation with other students, we can see projects of the others, the uploads of diverse examples from other participants. The overview, the possibility to go from one's work to another one's work. We can share our works and take a look at other student`s works.
I think that participation in creating workspaces was very interesting experience. At the meetings we was talking about important issues. I am sure all that knowledge (which I learned on workspaces) will be useful in future.
Works in group / team, improving my English, working in the group.
I have no opinion to this workspace, but it was nice graphic. :)
44. What didn't you like, could be done differently?
The webpage is not so clear. I think that the one problem was website, which sometimes did not work properly. The website is not clear, the structure is incomprehensible. It was difficult to understand this blind corner workspace.
Less time for a whole project...
Feedback and response to uploads was almost nonexistent. There need to be more interaction by participants through the workspaces. Faster evaluations from the teachers. The communication with other universities, more time spending in the classes with other students and their opinion
45. Please include any other suggestions for improving the OIKODOMOS Workspaces:
Searching for tasks and uploading the assignments sometimes was difficult. I really like the way that classes were conducted. The meetings and discussions were very interesting.
No idea.
Change the way of uploading, but in fact it doesn't matter.
Working on the camp site in the classes, more collaboration.

From other questions students generally found the collaborative environments worked well, even though the responses to Q.32 (above) need to be followed up. However, it's clear they still feel they need to meet face-to-face, so the best solution appears to be a combination of virtual and physical education in the design studios. There was almost no difference between responses of participants and non participants of the Bratislava workshop in most of the questions, but paradoxical with slightly higher scores from the group of non participating students in indicator questions. With the exception of the experience and benefits of personal contact, the results suggest that students can achieve the planned learning outcomes working collaboratively in virtual and face-to-face environments, and this is supported by feedback from the staff.

4.2.2 SWOT analysis of realized VDSs

STRENGTHS

- Realized VDS proved to support the interdisciplinary exchanges and the added value to sharing the wider context view (including socio-economic, regulatory or spatial problems) by students, teachers and other participants, and the contribution to solving complex, real situations.
- VDS supported the work in the multinational, multiprofessional and multicultural environment, though the teamwork was most effective during the Joint Workshops.
- VDS supported the sharing of learning resources and confrontation of learners skills in the same project, from the regional context and urban area scale to the building scale.
- VDS supported the association of other (multinational) partners to design activities. The perspective of leaving the strict academic circle and associate professionals, local administration or citizens is crucial. This was evident mainly during the Joint Workshops, but first attempts to use the collaborative environment (Workspaces) provide a promising start in the integration of external stakeholders for completing the designs tasks. This process is still difficult because of language or time insufficiency of possible external participants.
- Involvement of the remote participants using various ICT tools..

WEAKNESSES

- Reduced application of the VDS between project partners due to the differences in the study programmes and subject types involved in participating institutions caused unbalanced participation of partner's teams in common design studios. Realized VDS suffered from the lack of a clear program content, insufficient harmonization of the collaborative learning activities, not clearly set pedagogical objectives, learning outcomes and tasks.

- Content and main goals of VDS should be discussed in more detail in advance by the partners, with agreement on multiple local and joint activities; otherwise the participating students and staff may become de-motivated because the results do not always match the expectations.

- More laborious work for teachers and students while working on VDS. Preparation in the international studio assignment and working in multilingual environment requires constant effort, which is sometimes difficult, as most teachers or students have to combine this virtual adventure with their "main" academic projects. Adequate communication is the main condition for this pedagogic framework.

OPPORTUNITIES

- Realized VDS clearly proved their potential to support distant collaboration, independent of the distance, time, borders, and to support the knowledge of other cultures and diversity of disciplines.
- Collaboration in VDS supported the student's critical thinking through peer evaluation and commenting. Peer students can add their comments to other student's or group's delivery. This way they are accepting new roles as editors and reviewers, which is an important pedagogic asset of the VDS.
- Experienced integration of the theoretical and design tasks on common issue in VDS, together with specific localization of the design site, fosters the generation of topic and spatial referenced knowledge, which can be re-usable for other design solutions.

- Realized VDS encouraged the development of international study programme in housing design.

THREATS

- The VDS could terminate for the inefficiency of management the differences in the study programmes and subject types involved in participating institutions, the differences in schedule and grading, the lack of information about participating partners.
- Low impact of the realized VDS on the stronger integration in the existing partners curricula. VDS modules should find a clear equivalent position in existing training programmes. Expressing the value in ECTS could help the motivation for VDS utilization.
- The collaborative Workspace for VDS did not support the distant groupware awareness. There was a need to encourage of the distant collaboration through some additional activities and communication tools.
- Sustainability and continuation of common VDS and Joint Workshops after the project end.

4.3 Summary

The experiences over the three Joint Workshops has shown that the learning and teaching processes need to be well defined and coordinated across schools if the collaborative learning is to be effective.
The Workspaces have effectively supported collaborative working on the Big Camp project tasks, which lends support to the viability of virtual design studios. Students have expressed the value of the immediacy of contact and communication which they experience when working in a physical space compared to a virtual space and this raises more questions than any real difference in the kind and scope of Learning Activities which may be used. The real issue is how to increase that sense of presence of the students when working in a virtual space, to give them the opportunity to exchange ideas 'across the table' in a spontaneous and creative way.