

Semi-Medial Post Professional Studies "Building Conservation" for Architects and Structural Engineers

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The Post-Graduate studies for Building Restoration at the University of Karlsruhe is aimed at architects and construction engineers who wish to deepen their knowledge base as well as related professionals in the construction industry who wish to specialise. The goal of the project is to migrate the post graduate studies in restoration to a Master Degree program made up of physical and virtual presence requirements (dual mode university) and to transform the course materials into Learning Elements that can be used in other programs. The quality of the teaching should increase and reach a larger audience of interested parties at the same time. In particular, the program is aimed at current practitioners. A model is developed that incorporates classical presence based studies with modern internet-based learning methods to create a system, which does not completely replace presence-based learning: "semi-medial" studies.

Keywords: Distance Learning; Collaboration; CSCW; Renovation.

The need for the professional continuing education in the areas of architecture and building construction

The need for architects, engineers and scientists who have been trained to work in the field of restoration is steadily growing. Building restoration is not a short-term trend. Rather, it is a long-term societal need as the demolition of old structures and building of new ones to replace them consumes valuable resources and energy. Currently, approximately two thirds of construction activity is in restoration with a third being in new construction.

The German universities have, in the past few years, reacted to this situation through the strengthening of field specific renovation studies. The Post-Graduate Building Renovation Studies have been running at the University of Karlsruhe in co-operation with the Department of Education and

Consultation at the Centre for Historical Building Conservation in Dresden for four years.

In the transformation of the Post-Graduate Building Renovation Studies in a semi-medial Master Degree program, new information and communication technologies are specifically targeted as to their implementation. Alongside the preparation of learning elements for the continuing education, the aim is to increase the effectiveness and quality of the studies in general. The use of new media influences conventional teaching more and more and has led to a basic change in the learning and working structures. Through the ability of individuals to call up specific learning elements (learning on demand), the constantly growing demand for knowledge is supported in the spirit of "life long learning". Through this method, not only are the diploma students reached, but also the large number of practising architects, engineers and other experts are supported. The studies allow an individually structured and effective education that

Go to contents 12

is a time and place independent (open and distance learning). The linkage of field specific and media based didactical components enables the participants to control the intensity of their studies.

Creation and Contents of the existing Post-Graduate Renovation Studies

The Post-graduate renovation studies at the University of Karlsruhe is aimed at architects and construction engineers as well as related fields from construction and planning where practitioners wish to build on their practical knowledge or specialise. The centre of the program's contents is the conceptional handling of the materials in old buildings.

The program is made of 50 learning modules and are divided up as follows:

- Cultural History (about 10%)
- Building Evaluation (about 20%)
- Planning (about 35%)
- Construction Planning (about 25%)
- Construction Execution (about 10%)

The one-year program is divided into two "presence" semesters that are carried out in Karlsruhe and Dresden. Afterwards, students carry out a 12-week final project independently. The incorporation of external and university based experts into the curriculum ensures that a good connection between theory and practice is achieved.

Challenges and reasons for the conversion into a semi-medial program

In total, the one-year program is highly demanding and requires a high level of work and energy to be invested by the participants. It is not possible to be fully employed and to take part in the program. The complete retreat from the daily practice places an insurmountable financial and personal hurdle for many prospective participants. The migration of the presence-based studies into one requiring only one

presence semester and two semesters carried out as web based distance education will allow more participants from the group of practitioners to take part as well as to raise the quality of the learning elements through the use of multimedia technologies.

The program is focused around the connection of four basic tenets:

- Deepening of field specific knowledge
- Interdisciplinary Work
- Practice Related Information
- Transfer of new Knowledge from Research

At the start of the project, the idea was to raise the basic knowledge of all participants to a higher standard through the use of media based teaching tools before the presence phase began. During the research into potential migration solutions, it became clear that the success of modern Internet based communication and learning tools are extremely dependent on the interactivity and communication of the students themselves. For this reason, the first semester is important not only for the teaching contents, but also for the interpersonal contacts that are built during the semester. This socialisation of the learning group helps to foster better communications in the following tele-presence semesters. This replicates the experiences of four years of web-based design studios carried out at the University of Karlsruhe [Elger, Russell, 2000].

The current concept is to deepen and consolidate the knowledge accumulated in the first semester through the two following tele-presence semesters using multimedia based learning modules. The presence part of the studies is thus reduced to one semester and is scheduled for the winter semester. This will ease the retreat from practice for many potential participants in the construction industry as this period is historically less encumbered with new projects and work. A leave of absence for this term is thus much easier to arrange in many offices. The second part, the medial phase, continues thereafter for two semesters. In this phase, there is a minimum presence requirement of a few days. Otherwise, the participants are free to use the learning elements

independent of their location so that they are able to continue their professional practice. This reduces the financial load of undertaking the coursework. This also allows the current work and research practices to come together and provides the potential for new questions arising from daily practice to be brought into the medial phase. Likewise, current thinking in theory and research can be directly used in daily practice.

Metamorphosis of the Post-Graduate Studies in renovation into a semi-medial Master Degree program

The learning modules are to be organised into tutorials and collaborative learning environments, depending on the contents. The tutorials organise the learning materials into a clear interactive structure. A typical learning unit consists of an assignment, which allows the student to use the materials just covered. The computer supported collaborative learning environments put learning in small groups at the forefront. The knowledge transfer and execution of the assignments is carried out using internet-based communication tools. Simulation software as well as planning games (role playing) will complement the other two methods in order to convey specific aspects of building renovation.

Didactical Concept for Medial Learning Materials

In the previous learning modules, practice oriented case studies will be worked on based on the knowledge gained during the presence semester. The individual learning modules build upon the material of the previous modules so as to continually raise the knowledge (and the self direction) of the student. An Internet based platform serves the student and tutors alike in providing information, interaction and communication. In this way, as an example, discussion groups about topic in renovation are available not only to the program participants, but to the wider audience of the Internet in general. The tutorials and

consultations between tutors and students are based primarily on email, newsgroups and chats. These modern technologies allow the students to control the timing of their work and to augment the advantages of asynchronous communication such as email and newsgroups with synchronous (chat or videoconference) communication.

Based on the preliminary studies and the analysis of several existing medial learning environments, two special didactical concepts have been developed which pertain particularly to the education of building renovation.

Integrated Networked Assignments – Learning in Dialogue

The first didactical concept explains the integrated networked assignment. It puts the students into a methodology of teamwork into a knowledge area. The students receive materials in nine learning steps that provide information and instruction for materials necessary for the next step. The knowledge transfer is maximised through the step-by-step methodology.

The assignments in each step are to be solved cooperatively in small groups. In discussions with the other team members, the students are confronted with the different working methods and viewpoints of the other members. This then requires a certain amount of reflection as to their own viewpoints and the ability to reach decisions cooperatively through the discussions. This method will raise the quality of the learning process considerably.

In contrast to conventional exercises in a presence-based program, each student determines the intensity of studies needed to solve the assignment individually. This means that, in order to obtain solutions to the problems in renovation, the students must themselves decide which competencies they need to augment. As well, the ability to work in teams and to use the new media for communication is also required.

The field specific expert or tutor is responsible for the course contents. During the module, chats with the expert(s) are available to the participants. A

[Go to contents 12](#)

moderator oversees the entire module and is continually available to all parties. The moderator is responsible for the organisational as well as for the motivational aspects of the module. The moderator also gathers and sort questions and queries from the students to the experts. (See Figure 1)

Case based learning environments

Learning through simulation and understanding through experience

In the second didactical concept, the case based learning environments, using this information in an example case carries out the implementation of newly learned material. An analysis object is accurately described using text, drawings and photographs. Through specifically chosen questions, the students must then approach the problem through certain ways. Questions about legal and historical issues, the construction of the individual building elements and the failures or damage present help the students to understand the entire problem successively.

The historical phases of an object can be simulated using Internet based: before, during and after each construction phase. Normally, only one moment of the life cycle can be shown, whether in an assignment, in the lecture hall, or on the building site itself.

In this way, the analysis of typical problems in renovation such as technical installations, physical characteristics of the building and the properties of its materials can be trained for any object, whether it is a 16th century half-timber building or a prefabricated concrete panel building from the 1970s. The students practice with Through specifically aimed problems, the students obtain practice in areas such as failure and damage identification, building and building element analysis and causes of failure up on to the level of conceptional design of building repair and maintenance. Through individual mistakes, the students learn to optimise the use of the tools available to them (figs 1 &2).

The results of various building measurement and evaluation methods in building renovation are

available at all times to the students for interpretation. Not every method leads to an acceptable result. The connection of methods which help to organise the failure and damage analysis as well huge work of repair and maintenance is relevant to achieving a solution to the assignments. The estimation of costs and the lengths of time in the third part of the assignment involve a complex negotiation and decision-making process, which trained on the model. The different solutions can all lead to a similar end result, but are differentiated usually through the resulting costs. The case based assignment thus helps to clarify the entire process and working methods and to train for efficient solutions. (See Figure 2)

The feedback to the students is achieved either through the learning exercise (internal feedback) or through asynchronous communication with the assignment experts. The establishment of this medial assignment is very complex. Assistance is more meaningful through email as it is through a chat as the experts and critics can reflectively comment and answer questions from the student.

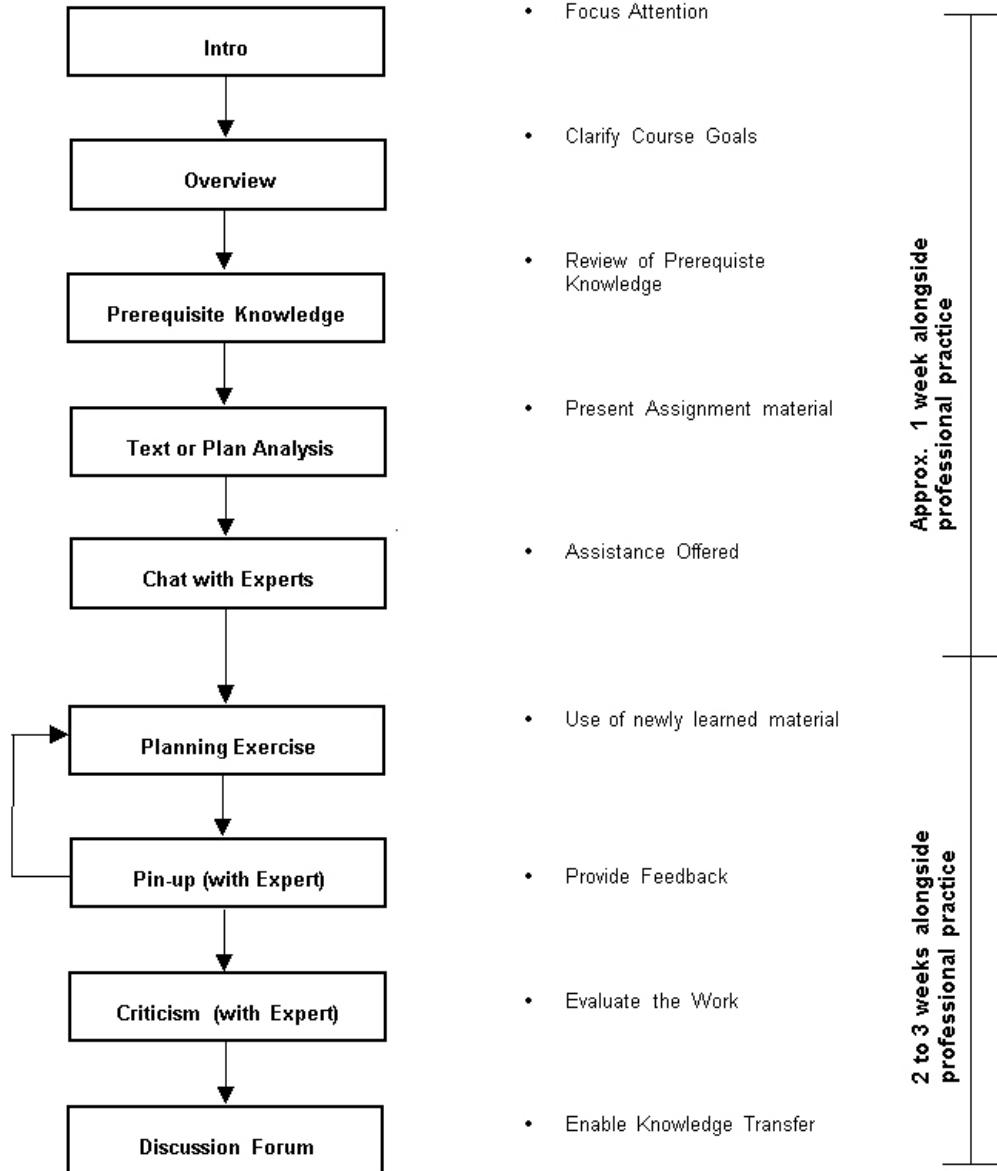
Prototype

The prototype will be based on projects already carried out in the realm of medial-based studies in the guise of the Virtual University Baden-Württemberg. In close cooperation with the Institute for Industrial Building Production (ifib) at the University of Karlsruhe, a real life case study is to be visualised with functionality conforming to the didactical concepts incorporated in the learning platform. Professor Jürgen Vogeley from the Department of Building Materials and Products, University of Karlsruhe, is supporting the content creation of the prototype. The Distance Learning Department at the University of Karlsruhe is assuming a consulting role as in the conceptual development of the medial studies, their technologies, and the education of the educators.

Perspectives

The medial learning modules are so designed that they can be used in the continuing education for

Figure 1. *Integrated Networked Assignment*



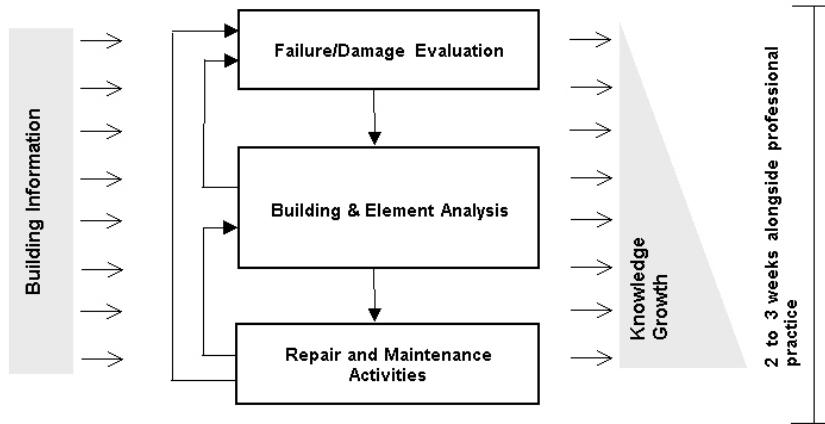


Figure 2. Case Based Learning Environment

architects and engineers. Continuous changes and updates are possible through the use of modern, internet-based communications methods and allow the development of a dynamic extensible information system.

The large number of experts from various universities and industry is important for the attractiveness of the current post-graduate renovation studies. The participants are able to take advantage of the professional experience of the experts as well as from the results from the special research department 315, Maintenance of Historically Important Buildings, at the University of Karlsruhe. Through the implementation of new media, new possibilities for communication and knowledge transfer are enabled. The education platform of the post-graduate renovation studies is also accessible after the completion of the courses, which will allow for further information exchange.

The medial education modules can also be used as base modules for other continuing education courses. Users can then choose from the palette of modules to create a personal study curriculum. Each individual module has its own accreditation. Upon completion of all modules, the student then receives

his or her accreditation. Each module also carries credits that can be used should a student wish to transfer to another school or program before the completion of the renovation studies.

The project depicted here is unique in Germany in its combination of historical monument maintenance, restoration, building documentation and renovation in one program, not only in the post-graduate studies. The program also strives for cooperation with national and international partner Universities. The intention is to establish a knowledge bank through inter-regional cooperation in the field of maintenance and renovation of historical monuments and buildings that will serve many needs, uses and interests by a variety of users as they see fit.

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