Integrating ecology into architecture

"Ecology in Architectural Design" (EAD project) aims to develop innovative and multimedia teaching tools for the benefit of architecture students, ensuring that ecology as a subject becomes an integral part of architectural design. These tools and eLearning will help future architects become ecologically aware and acquire a conscious and sustainable approach to design, where energy and materials may be used in a more effective and rational way. Supported financially by Swiss Virtual Campus, the project is spearheaded by USI's Academy of Architecture, Mendrisio, in conjunction with the University of Geneva, the *Fachhochschule Zentralschweiz,* and SUPSI. Technical support in the realisation of the project is provided by eLab, the joint USI-SUPSI laboratory for the application of eLearning.

Human activity, the scarcity of energy sources and raw materials, extreme weather events, ballooning demographic growth: considering the global impact of all these on the environment, no one will deny the importance of a sustainable management of the territory. On no account, therefore, can an architect disregard anything that is related to ecology, the environment and energy, whether applied to the single building or to the territory. Paola Caputo is an engineer and co-director of the project "Ecology in Architectural Design" (EAD) with Dr Moreno Molina, both on the teaching staff of USI's Academy of Architecture at Mendrisio. She told us: *"In our day and age there is no longer any need to prove the fact that ecological principles are part and parcel of the thinking and practice of any architect. And yet, building design is still largely informed by purely aesthetic and/or economic criteria"*. Policies and actions need to be developed to curb pollution and environmental damage and to preserve the wellbeing of the population through legislation, through setting standards, guidelines and experimental programmes. Think for instance of the Swiss trademark, Minergie®, or of such standards as 'passive house' or 'zero energy house', or again of the European Directive on the energy performance of buildings. *"To be ecological or sustainable a project must limit the flows of energy and materials both during production and during use. A project should be qualified as ecological solely when it fulfils all the necessary criteria"*, underlines our researcher. The aim of the EAD project is to create 'blended' eLearning courses, where students and future practitioners are handed the necessary instruments allowing the full and scientific integration of ecological issues into the architectural design. This sort of approach is far from widespread across all schools of architecture, where it is difficult to integrate energy-environmental issues into laboratory activities. USI's Academy of Architecture has created this opportunity, based on the development and application of the EAD project. Launched in July 2004 and expected to last two years, the project is funded by the federal programme 'Swiss Virtual Campus', and is run by USI's Academy of Architecture. Members of the research team are: Dr Moreno Molina, Paola Caputo (engineer, co-director), Professor Jacques Vicari (architect) and Andrea Roscetti (research assistant). The technical support team includes Isabella Rega (educational design), Christian Milani (IT implementation) and Patrizia Schettino (graphics) of eLab.

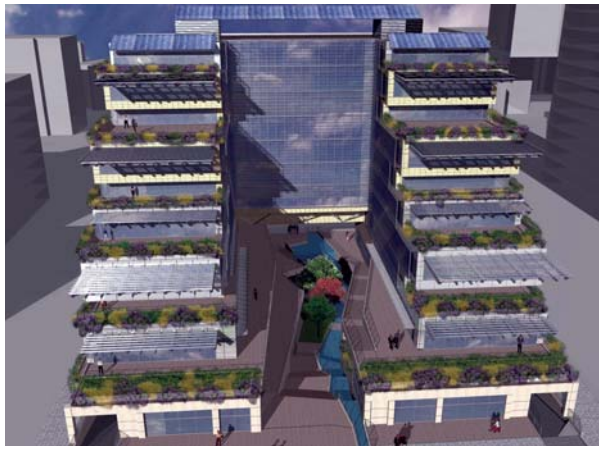
"Biotop" building, by Reinberg, architect.

Partners and funding sources

The project benefits from funding allocated by the Swiss University Conference within the Swiss Virtual Campus, the national programme studying the introduction of information and communication technologies in universities of applied sciences. The project is run by the Academy of Architecture of the Università della Svizzera italiana, in association with the *Centre Universitaire d'Etude des Problèmes de l'Energie* (CUEPE) of the University of Geneva, a leader in Switzerland on energy issues; the *Hochschule für Technik und Architektur* (HTA) of *Fachhochschule Zentralschweiz* (FHZ), a centre of competence in the building technique area; the Laboratory of Energy, Ecology and Economy (LEEE) of the Architecture, Construction and Design Department (DACD) at SUPSI, a centre of competence for photovoltaic energy. eLab (the joint USI-SUPSI laboratory for the applications of eLearning) guarantees assistance and technical support for educational and graphic design and technology.

Integration of innovative teaching tools

Within the EAD project, the implementation of a course is nearing completion. Intended primarily for students of architecture, the course is divided into two broad parts, one is devoted to the building and the second to the territory (landscape). Each comprises six modules: water, air, earth, energy, population, and climate (for a total of 12 modules). *"Ecology is defined as broadly as possible, and covers the environmental components (earth, water, and air), interaction with the climate, the dynamics of the population and energy flows"*, says Paola Caputo. In the academic year 2004/05, the prototype module of the course on the building–climate interaction was tested on first-year undergraduates at Mendrisio. Conceived to fit a blended format, this module combines learning periods in the classroom and in the laboratory, face to face with teacher and assistants, with virtual learning periods, in groups and individually. The support assured by eLab (the joint USI-SUPSI laboratory for eLearning applications) has contributed to the creation of a package of innovative and multimedia teaching tools accessible through an eLearning platform. Main instruments are the multimedia case studies, whereby a student is able to navigate virtually inside existing buildings, as well as several interviews conducted with specialists on given subjects. There is another important instrument, called task, a macro exercise that acts as a guide for the students for the whole duration of the module, and which checks to what extent the teaching has been assimilated. For instance, by means of simulations, the student can ascertain the impact of different architectural choices in terms of energy, air, or water flows, and that is possible through simple software packages downloadable from the net. *"Even though they come from a variety of countries, some of them with less than perfect English and scarce familiarity with the Internet, they have expressed their satisfaction with the experience"*, declares our researcher. By the end of 2005 all modules will be complete, and the next stage will be the reviewing and optimisation of the EAD modules which, allowing for the necessary adjustments, may serve other purposes: for instance that of Master's programmes, and of specialist or refresher courses for architects and engineers. *"Future course scenarios are currently under study, but we certainly hope that experiences of this kind may be tried again and that close cooperation with laboratories or other Architecture and Engineering Faculties may be set up"*, concludes our engineer.



The "Sino-Italian Ecological Energy Efficient Building" (SIEEB) project, Beijing. Scientific director: Federico Butera, Milan's Politecnico. Architectural design: Mario Cucinella.

eLab

eLab, the Laboratory for eLearning applications, was set up on the basis of an agreement between USI's New Media in Education Lab (NewMinE Lab) and SUPSI's Teaching and New Media Services (SDNM). eLab aims to promote and make available proper support in the development of eLearning applications not only on behalf of USI and SUPSI, but also across the entire Italian-speaking region of Switzerland. eLab offers several teaching support services to professors and assistants of USI and SUPSI. These services include seminars on the use of information technologies, technical assistance, hardware and software resources and online platforms for sharing teaching material. In addition, eLab supplies technical support in the execution of all new projects of Swiss Virtual Campus launched by USI or SUPSI, both in the initial and consolidation stages of the projects.

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Nr. 24 - December 2005; English translation: Simona Cain
www.ticinoricerca.ch/progettomese.htm

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