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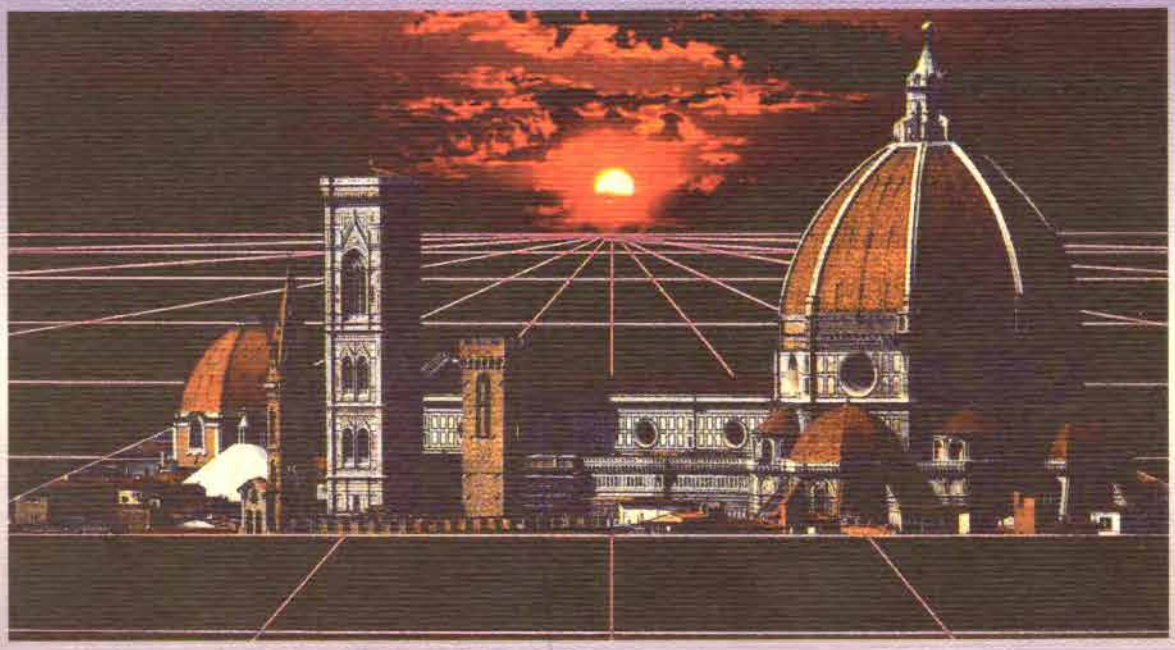
Florence International Conference for Teachers of Architecture



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A CURA DI MARCO SALA

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TEACHING BIOCLIMATIC TECHNOLOGY. THE RESEARCH INTO EXPERIMENTAL DIDACTICS.

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ABSTRACT

The paper briefly summarizes methods of performance assessment, and discusses an integrated performance analysis on the teaching of sustainable building design.
In architecture there exists the need for energy-saving consciousness and the necessity to devise a swift and simple way for the teaching and diffusing of the themes of sustainability, so that the level of discussion may become more stimulating.
The potential derived from the experience of teaching enriches the research on didactics itself and in a reciprocal way, the transposition of the results of didactic research assumes a notable importance; consequently there is a reappreciation of these disciplines required in the architecture field, such as technologies, allowing the investigation and transfer of results into building practice.

1. INTRODUCTION

For some time, the teaching of technology, defined as the doctrine of the process of building transformation, has addressed the actual transformation not only of the process connected to progress, but also in a particular way to the environment, favouring the indiscriminate use of disposable resources.

Throughout the world the subject of extreme conditions of environmental pollution and the exhaustion of energy resources is topical and widely discussed. Nowadays these same disciplines attempt to confront the problems connected to the managment of these resources as a basis for a sustainability which is still not fully comprehended: their future role will be that which confronts those issues incorporated in new procedures or unusual research applications on new materials, proposing as a doctrine that which has the task of translating methodologies and compatible, adaptable and reversable procedures in order to allow guardianship and control of environmental quality.

2. BIOCLIMATIC TECHNOLOGIES

In the architectural field, the doctrine of bioclimatic technologies may be inserted in this scenario a somewhat complex disciplinelarge tracts of which are relatively unexplored, with a role which allows an actual alternative and an innovative contribution to the advance of the cultural debate

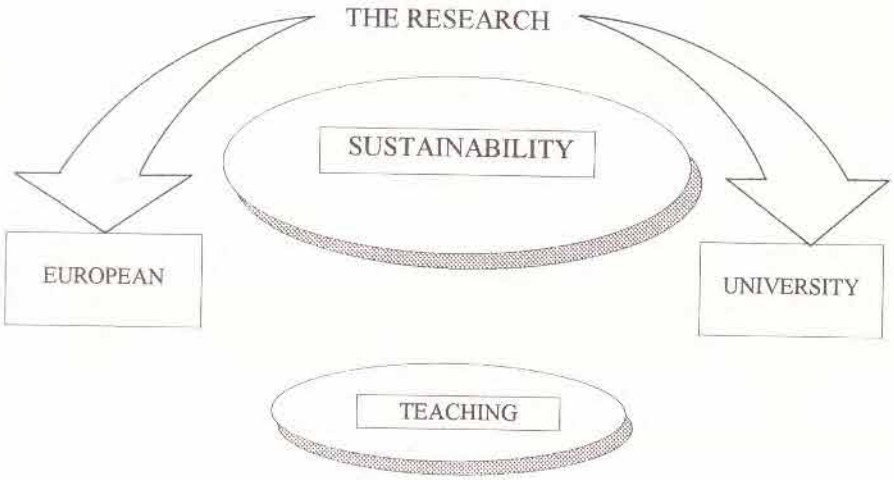
on sustainabilty, but moreover capable of offering parameters, methodologies and procedures in the operational sector of 'made architecture'.

It is, in fact, noticeable that in the realm of existing architecture there is a lack of knowledge in the confrontation of the problems of energy savings even more so at a national level; consequently it has become necessary to utilise the simplest model for dissemination and teaching in order to make the discussion more interesting, lively and stimulating. In particular it is necessary to perceive that contribution which is really alternative or innovative therby contributing to the world debate on sustainable technology, not only in the cultural sphere but particularly within the operational ambit.

The teaching of the Bioclimatic Technology discipline, inserted in architectural degree courses, constitutes the first phase of integration of the problems connected to the energy-savings in the architectural field.
It is too often that we do not take account of the interventions we make on the environment or our elevated consumption of energy resources and the transformations which we inflict on the environment;
These are constantly problems to solve during the building process which should be addressed at the appropriate time during the various phases of planning and of building design, and should not be dealt with seperately or put to one side until the final stages of the project.
The need to integrate problems connected to energy resources becomes more and more obvious, (in reference to both consumption and saving methods) thereby proposing a complex vision of design.

2. THE EUROPEAN EXPERIENCE

From this point of departure what is missing today is perhaps the inability to manage the quantity of available data and the ability to have an integrated vision of the problems, but great steps forward have been taken with the assistance of integrated computer programmes, which allow the operational interaction and understanding of the data with a view to the resolution of our problems.
Furthermore, in the presentation of the last 'Program Structure for Scientific Research and Development' the European Union has dedicated more resources and more space to the themes of sustainabilty in buildings and renewable energies, which have experienced an increased importance in the last few years; consequently more strength and a broader financing has been given to the areas of 'Environment', 'Life Sciences and Technologies' and 'energy issues', proposing research programmes which to a large extent are oriented towards the safeguarding of environmental resources, from the aspect of energy savings and respect for the environment.
Through research undertakings in numerous recently consolidated programmes such as 'Thermie', 'Life', 'Environment', a more complete comprehension of the complex vision of the environment both as natural and anthropological has been reached, where man constitutes a point of conjunction through the management of knowledge and resources the interventions of whom may then be offered in return to nature.



3. ENVIRONMENTAL QUALITY

The coherence between ' Urbanism' and 'Bioclimatic Architecture' is an essential condition to obtain relevant results in terms of the quality of construction, energy economics and respect for the environment, elevating contemporary quality of life within buildings and urban spaces, and also in the relationship between the artificial and the natural environment.

For this reason technologies which use direct and indirect solar radiation for the production of 'clean energy' have been developed over a number of years in many geographical sites which are climatically different, allowing in many cases full economic competition with traditional sources (whose environmental and social costs are not considered) to be obtained, thereby offering the possibility of the development of the entire country.

In many countries this building practice has for the most part been disseminated, contrasting with the situation in Italy, where, although a favourable climatic situation and ease of orientation exists an appropriate way to reduce energy consumption has not yet been found.
In particular the Italian experience may develop an original and interesting practice that has been constituted by the consolidation of 'energy recovery' where the insertion of resource saving systems through the utilisation of bioclimatic technologies are applied to existing buildings within a consolidated urban context.

4. THE DIDACTIC EXPERIENCE

The educational training of students is a resource central to the life of developed economies, which in competition with other countries having a low cost of labour, could oppose the qualification of products, of processes and consequently the human sources which realised them.

The university teaching of Sustainable Technology in architecture, is finalised in the training of the student able to assure a high professional quality in the architectural field of the future.

What is important today is the transfer of results into the field of applications, the workplace and the teaching realm, and to that work devoted to research programmes in the academic sphere using parameters developed in the university and productive world.

The capacity to transfer didactic information on sustainable architecture implies the formation of a future responsible design group, capable of directing all project phases, using planning and project management devices with a constant reference to a rational use of energy.

Sustainable teaching in architecture, has as its prerequisite the neccesity to make students aware of the fundamental project parameters and in particular of technological aspects, both in reference to the built environmental and the natural environmental.

The ultimate intention, therefore, could be defined as the realization of a profound level of energy consciusness and an awareness of potential environmental energy sources, (solar, windmill, etc., the list of which could be inexhaustable), through the utilization of which gives an internal environment with high comfort level, and at the same time guaranteeing the minimum negative effect on the natural environment.
An important challenge that lies ahead, however is to ensure that in the design of new buildings, opportunities are maximized to ensure that by the appropriate choice of form, orientation and distribution of fenestration, the building has, as far as practicable, a reduced basic energy load. Auxiliary heating and cooling systems should have response times that make the most use of the environmental control capacity offered having electrical lighting systems and controls that should be designed and controlled so as to optimize the use of daylight.

5. RESULTS

The rapid evolution of the technology of constructional building systems, makes the acquisition of information for a basic knowledge difficult.
The failing of critical consciousness is particularly evident in the sphere of bioclimatic principals in architecture, and in the exploitation of renewable energies, since recent developments of technological knowledge have still not been organised in a systematic way to obtain clear results.
The teaching carried out at the University of Florence for students training for a bioclimatic competence, is conditioned by the shortage up-to-date dissemination of new technologies.

Although there is a continuous evolution in the use of building materials, the rate of change is slow and those materials which were important twenty-five years ago and more, for example masonry, concrete, wood, steel, glass and even many plastics, are just as important today.
Nevertheless, there continue to be developments in the properties and methods of use of the existing building materials as well as their applications. Developments in glass, rigid plastics and fabrics over the last twenty-five years have already led to new kinds of architecture, when these materials have met a specific need.
Bioclimatic design uses the traditional materials with new goals referring to the environmental conditions within the building and the energy balance.
Good results are obtain in many exemplary works for office buildings, residential buildings and old factories, with the use of ventilated roofs, ventilated walls, solar chimneys, absorption walls,

greenhouses, and other technological systems capable of bettering the internal environment and benefitting the natural ambient.

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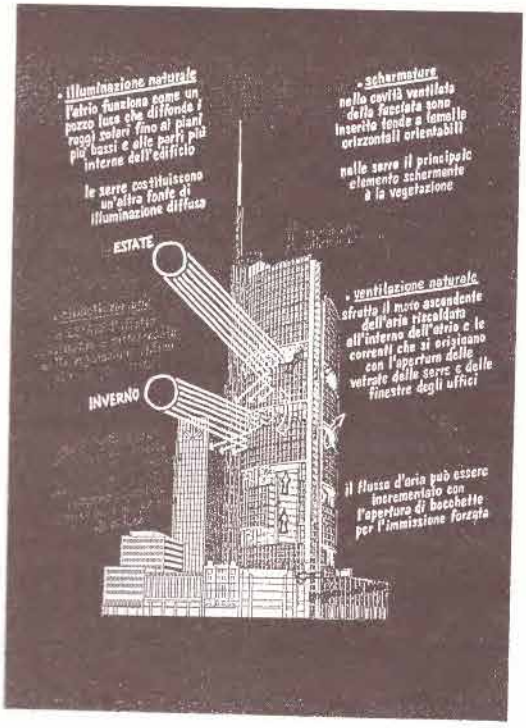

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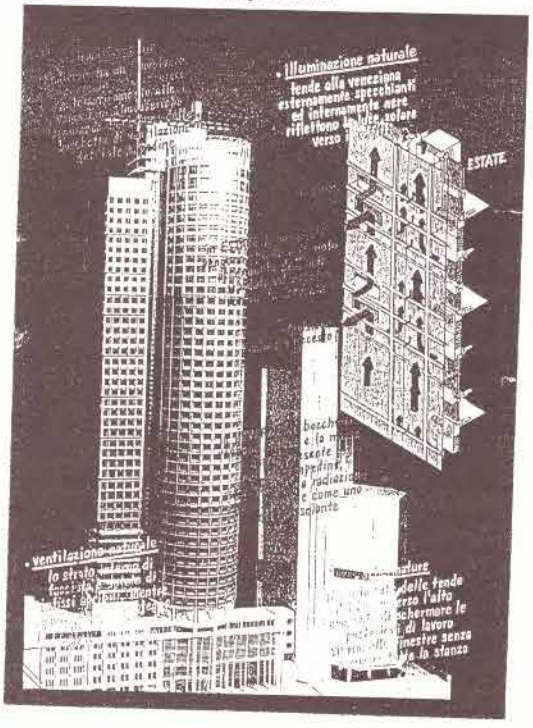

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