Implications of the Term 'Sustainability' in Architecture. Teaching Tools for Lecturers

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ABSTRACT

Society in the physical medium, that is, culture, is reflected in architecture understood in its wider sense as habitability, and especially in its location within the territory. The appropriation of the territory by means of architectural structures is one of the main human cultural mechanisms to control the environment.

The development of cities and the territory concerns several collectives and generally it derives mainly from political decisions. But it should not be forgotten that the ultimate technicians responsible for the physical development are architects, urban designers and engineers. For this reason, it is essential that these people have some environmental training that allows them to develop their work from a sustainable focus.

This article proposes the introduction of environmental aspects as the very essence of the concept of architecture; it seeks to explain how these aspects are introduced from an understanding of the relationship man–environment that cannot be detached from the concept of habitability and therefore from architecture itself.

In this sense, the importance of education is a key factor in the formation of the values that influence the professional activity. The introduction of these aspects must be carried out from the teaching of architecture itself, as it from here that new professionals will arise.

Therefore, the introduction of an environmental thinking in the teaching of technical, scientific or humanistic issues is necessary. The lecturer is the key figure in terms of teaching and ideological approach, so that the effort for change needs to be focused upon their own training. In order to achieve this, a series of environmental records are proposed which will help the lecturer to reinterpret the teaching of the topics taught until now, refocusing them towards an environmental approach related to the new paradigm of sustainability.

INTRODUCTION

Since 1996, a large number of activities have been carried out in connection with UPC's Environment Plan aimed at introducing environmental issues into the curricula of the different faculties and schools that make up the University, in a process known as curricular greening.

In the specific case of UPC's School of Architecture of Barcelona and School of Architecture of the Vallès, plans for their greening have been drawn up, and such plans have also been drafted on a cross-sectional basis for specific departments, such as Architectural Technology I and Planning. In addition to these greening plans and with the aim of supporting and reinforcing them, a large number of tools have also been developed, focussing mainly on students and teaching staff, as basic tools for the implementation of those plans.

The greening plans of the Schools of Architecture are based principally on the analysis of the environmental status of the subjects through surveys of the teaching staff in general and interviews with the lecturers who are responsible for core subjects in particular.

The results of the different analyses show that there is no clear paradigm in response to demands for reliable professional practice in connection with environmental issues in architecture. Consequently, there is only a relative degree of interest in environmental issues and above all a pronounced lack of clarity as to their significance and implications.

The key factor in the introduction of new approaches to teaching is the lecturer and the actual possibility of dealing with these new issues in the subjects will depend on his or her conviction that the issues are important ones. This is why the existence of tools to help teaching staff to adjust their teaching and introduce environmental issues is fundamental. This paper presents a specific example of such a tool.

UPC'S ENVIRONMENT PLANS

Since 1996, the Technical University of Catalonia has taken part in the process of awareness and solidarity involved in adopting a position in support of reducing environmental impact.

Due to its success in a large number of endeavours, UPC has drafted a Second Environment Plan for 2002-2005. The main objectives of the Second Environment Plan are the following:

- To strengthen UPC's commitment to sustainable development.
- To involve all members of the university community in UPC's overall process of greening.
- To optimise the management of sustainable resources and effect an overall global impact on institutions.

The Plan calls for 13 projects, which will be divided into the following four areas:

- Training
- Research and doctoral degrees
- Campus and university life
- Coordination and communication

In the context of training, the Plan follows through with the curricular greening of the teaching provided in all disciplines at UPC. This is the aspect that we wish to analyse here, and in particular the experience gained with the greening plan for the Department of Architectural Technology I.

CURRICULAR GREENING

The aim of curricular greening is to introduce the environment and sustainability into the syllabuses of all the degrees offered by UPC. This aim is to be accomplished through a combination of different actions focusing on its attainment.

Training resources are created:

- Virtual space of curricular greening resources for technology
- Acquisition of environmental literature
- Training courses for teaching staff
- UPC Environment Guide

The virtual space of curricular greening resources for technology follows a strategy of developing teaching resources in each department's area of knowledge. This has led to the idea of compiling the collection known as "Notes on the Environment".

TOOLS FOR TEACHING STAFF

The collection "Notes on the Environment" is complemented for each department with a practical section entitled "Curricular Greening Materials", which users can access online.

The material has been organised along departmental lines. Each department has different modules corresponding to the respective section of the theory set out in "Notes on the Environment". In the modules, users will find a list of materials with practical examples of interaction between the environment and the subjects offered by the department. The modules also provide exercises and problems, and a self-evaluation test. To facilitate its use, each module has its own glossary, bibliography and references, which allow both teaching staff and students to expand their knowledge. The materials can be downloaded separately in PDF format, making it possible to use only those materials that the teaching staff and/or students consider necessary.

Lastly, users have a research service at their disposal that will allow them to choose the materials by department, subject, topic and/or keyword, resulting in a valuable educational tool that is easy to use.

CURRICULAR GREENING MATERIALS

The curricular greening materials presented in this paper are those provided for the Department of Architectural Technology I. The aim of these materials is to address the challenge of introducing environmental issues in particular and the paradigm of sustainability in general into the teaching of architecture.

The strategy applied to attain this aim is based on a series of documents that deal with the topics that are normally touched upon in the teaching of construction in architecture, but in this case explained from a new standpoint that takes into account the restrictions imposed on architectural embodiment by the paradigm of sustainability: the closure of material cycles.

Current teaching. Criticism

The teaching of architectural technology in our schools of architecture, as a rule, ignores and is therefore uncritical of the discourse of sustainability.

The model promoted is the industrial model, understood as the only model that can ensure efficacy in the attainment of levels of quality required of construction materials, those levels of quality being defined, on the other hand, through regulations and standards that are promoted by the industrial

production system itself as one of the means for the exclusion of traditional production systems.

In these circumstances, technical education becomes merely instrumental and the mission of the subjects in this area is then seen as the explanation of how things are to be done, in other words, how things are done, the nature of the objective conditions for the production of architecture on the basis of presentation —representation, ultimately, as a mental construct—of the reality of the industry.

Thus, architects' training is strictly technical, and not technological. They will be familiar with the technical systems that are available and will, at best, be capable of understanding the changes in architectural form that will result from their use. However, they will be passive in respect of the evolution of architectural production systems, to the point that they will believe that this aspect is not their responsibility, in spite of the fact that it has such a major impact on the evolution of the product that they generate.

The delegation to the technical systems of key issues in the professional conception of architecture is the main impediment to the introduction of sustainability in the training of architects. It requires a change of values, or rather the acquisition of values, in the face of an uncritical stance, the recovery of an active role for architectural technology in the training of architects, which should cease to be merely a supply of information as to the characteristics of a dominant production model, to become instead a privileged area for completing architects' training to meet the challenge of sustainability.

The acknowledgement of the importance of technical aspects in the formulation of a suitable response to the demand for sustainability, the demand for closure of material cycles in technical processes, forces us to reconsider the architect's area of action, their role and their responsibility.

Identifying and assessing the flows of materials that make construction and the practice of architecture possible thus becomes the most pressing task for research in our profession. The next task is to analyse each of the flows of materials identified and to determine how distant they are from the status of closed cycles, as well as the possible alternatives that would attain that status. The areas touched upon in the performance of these tasks will point out the architect's new areas of action and consequently their needs for technical knowledge.

This view will not only provide new perspectives on the technical systems of architecture, but will also lead to a revision of the objectives that we pursue when we build and their rationalisation and the strategies that we apply to attain them.

Architects must once again become managers of resources, although on the basis of a new conception that must ensure closure of the material cycles involved in architecture through a plan that, going beyond mere formal definition on the basis of certain prior resources supplied by a given industrial milieu, will also constitute a strategy for obtaining them in a suitable manner. This will mean considering a broader field of action than the one we know at present as our own in the profession.

The role of teaching technology, in contrast to the current exercise of the profession, must essentially be a critical one. In other words, one that is endowed with judgement and opinion, and that compares that opinion with the unsustainable reality of current architecture, pointing up models for professional practice that tend to mitigate the problems posed by it and to expand the architect's field of action to enable them to provide responses to the challenge of sustainability.

Proposed curricular greening materials

The aim of curricular greening materials is for them to be a tool for lecturers that will allow them to address teaching from the new standpoint of sustainability. Lecturers will be able to identify the architectural content that is normally taught, but seen from this new standpoint, and therefore including new concepts and criteria.

These materials constitute a new list of topics of construction in architecture and will also allow students to study these topics in greater depth.

Structure of the curricular greening materials

The structure of each file is based on the following points:

- Introduction
- Theoretical description
  o Description of the architectural strategy
  o General principles
  o Objectives
  o Aspects involved
- Practical example of application: architectural solution

Only a few topics have been dealt with so far, but the aim is for the materials to address all the most representative examples and gradually expand on concepts and knowledge.

In the case at hand, the topics exemplifying this mechanism are the following:

- Thermal comfort: Popular housing in Osuna
- Luminous comfort: Home for a painter in Seville

Both topics fall within the scope of bioclimatic architecture and the files start with a conceptual

introduction to that subject and explain its different aspects.

The two aspects presented are then dealt with in greater detail.

On the basis of that presentation, with specific architectural examples, the architecture is analysed in terms of its thermal and luminous behaviour respectively.

This is done through comprehensive analysis of the architectural examples in connection with their climatic environment, geographic location, cultural context, etc.

An explanation is then given of the construction materials and systems that allow this behaviour and the attainment of comfort inside the building.

Lastly, a model is proposed for analysis of the climatic conditions in the place where the building is located, to provide the proper references that can generate solutions determined by the architectural design.

The materials include a bibliography on the subjects dealt with and a sort of survey that helps to ascertain the degree of assimilation of the knowledge by the lecturer or student consulting and using the materials.

These materials exemplify specific architectural contents and how they involve architectural solutions depending on their situation. The handling of these topics constitutes a model to be followed in respect of a design reasoning that incorporates the demands imposed by the concept of sustainability. Consequently, the materials constitute a model for teaching methodology that provides teachers and, secondarily, students, with new options for learning and an approach to more critical architectural-technological thought.

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