

NEW OPPORTUNITIES IN TEACHING SUSTAINABILITY IN SPAIN BY COMPETENCES

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ABSTRACT: This article presents a reflection regarding the new opportunities that have arisen for the new Spanish architecture curricula adapted to Bologna. Beginning with the study of the new curricula structures and modules in the different schools of architecture and following with the environmental and sustainability related competences[1] and skills an architect should acquire, it presents a proposal of integration of those skills in the curricula in a transversal way. The curricula of two different schools of architecture have been studied in depth, the curriculum of Seville and A Coruña, due to their particular structures based on a workshop module where technical knowledge and design skills are developed in an integrated way. The specific competences that could be integrated in these special workshop modules are developed and the possible methodologies that could be used are proposed. The possible further diffusion and useful integration of these strategies in some other Spanish and European architecture curriculum are studied and proposed as well. These research belongs to the EDUCATE European Project [4] that aims to integrate the environmental sustainability issues and methodologies into the European architecture curriculums.

Keywords: education, sustainability, sustainable architecture, competences, learning skills

1. STATE OF THE ART OF ENVIRONMENTAL TEACHING IN SPAIN

Spain is currently delved in the process of discussing the powers granted to architects as practitioners. The Ministry of Education, the universities and the National Chamber of Architects of Spain are trying to reach an agreement that does not imply a change of the powers that architects have nowadays in Spain, and also that make sure these functions are not transmitted to other professionals. Within this frame, the Schools of Architecture throughout Spain are working on the adaptation of their syllabuses to the Bologna process. Very few Architecture schools have actually adapted to this protocol and many syllabuses are being developed and therefore are still not accredited nor validated by the Ministry.

Due to this situation, in Spain it is difficult to find examples where environmental contents in teaching have been developed and tested, both at undergraduate and graduate level. However, the organizational and methodological structures proposed by some syllabuses show the potential opportunities that they can develop. This is the case of La Coruña and Seville, as we will comment later on.

On the other hand, we find some examples – consolidated to certain extent- at the

postgraduate level which specifically work on environmental issues,

although only at the theoretical level. As environmental contents are virtually inexistent in the syllabuses at the graduate level, in postgraduate studies it is impossible to introduce practical issues, for the focus is set on the change of mentality and raising of awareness as well as in developing theoretical aspects unknown to the students. These postgraduate studies are the following: Masters in Environmental City and Architecture, University of Seville; Masters in Renewable Energies: Architecture and Urban Planning. The sustainable City 2009, International University of Andalusia (UNIA); Architecture and Environment: Integration of Renewable Energies in Architecture, Polytechnic University of Catalonia (UPC); Urban Environment and Sustainability, Polytechnic University of Catalonia (UPC); Masters in Bioclimatic Architecture, Polytechnic University of Madrid (UPM). In Spain, some environmental contents are found in the graduate syllabuses of the Schools of Architecture of Barcelona and Vallés (Polytechnic University of Catalonia), La Coruña, Granada, Madrid, San Sebastián, Seville and Valencia. The case of the new syllabus of La Coruña –yet to be implemented– is particularly interesting. The degree consists

of 300 credits and it ends with the presentation and advocacy of a Final Project. The credits of the syllabus are distributed in four-month subjects, each of which corresponds to a module. Teaching is approached through the WORKSHOP as a learning tool. The Workshop is a working space to exchange knowledge and has been conceived to facilitate the confluence of contents of the different subjects around the architectural design project. The aim for this is to ensure optimization of teaching resources and rationalization of student work. This workshop may be the most appropriate space to work on environmental issues to be introduced.

The School of Architecture of Seville is introducing a similar workshop in its new syllabus –supported by six teachers who teach simultaneously different architectural disciplines-, promoting interchange and an integral approach very suitable to deal with transversal aspects to architectural knowledge such as environmental issues.

2. ENVIRONMENTAL DESIGN IN THE ACADEMIC CURRICULUM OF THE SCHOOL OF ARCHITECTURE OF SEVILLE

Since the 1980s, this school has hosted a research group initially called Seminar of Bioclimatic Architecture and later Seminar of Architecture and Environment which has been developing environmental issues and applying them in the teaching methods of the module on Architectural Composition.

With the gradual introduction of the 1998 curriculum, the modules "Architecture and Environment" and "Planning and Environment" are created, being elective 1 semester modules of the 4th and 5th year respectively. The theoretical content and methodology of the practical classes of these modules is as follows:

Architectural Composition: Knowledge and understanding of the architectural fact in all its complexity from a scientific, environmental, hermeneutic or formal approach.

The environment is considered one of the main variables to be taken into account in the architectural and urban project, thereby occupying a prominent place in the program. Conceptual issues are addressed, and examples of environmental architecture and urban design are studied. Students are asked to include these issues in their practical work.

Architecture and Environment: Ecological and scientific fundamentals of dwelling.

The program proposes a structure and treatment of key issues to be considered when undertaking an architectural project and also

approaches a design methodology that includes energy-environmental criteria in the development of the architectural project. The student is asked to do an in-depth practical work on a research topic of their choice among the contents of the module.

Environmental Planning: Planning and Sustainability. This module considers the relationship between the city and the territory from a sustainability perspective. Urban planning in used and developed as a basic tool for the protection of natural areas and proper management and planning of land in general. It addresses the design of the urban space from a planning methodology that uses sustainability indicators. The students share a common practical work in which, without losing the overall perspective, different groups of students cover a specific topic or a particular field in both the gathering and analysis of information and in the design process. The groups show their work to one another periodically.

We should also point out that many modules clearly address environmental issues without actually considering them specifically environmental. Some examples are Physics II, Theory of Architecture, Solar Geometry, Construction III, Construction V, Other Technologies, Organization and Management of Works, Installations, Architectural Design III, IV and V and Solar Energy Installation in Architecture. Moreover, it has to be pointed out that many teachers of this school have shown interest in the gradual introduction of environmental issues, many of whom have been gradually introducing them in different modules of the academic curriculum.

Considering that environmental issues are intrinsic to architecture, it is necessary to include, increase and emphasize environmental contents currently present (and those to be included) in core and obligatory modules, so that they are part of the basic training that any architect with a Bachelor degree should acquire. The new syllabus that is now beginning to be developed and taught in it's first year, is a great opportunity to work on, specially into the new courses developed as workshops supported by six teachers who teach simultaneously different architectural disciplines.

3. ENVIRONMENTAL DESIGN IN THE ACADEMIC CURRICULUM OF THE SCHOOL OF ARCHITECTURE OF A CORUÑA

The syllabus the School of Architecture of La Coruña has generated -within its marked structure of annual and semester modules- a

workshop space in which students study the relationships between the different disciplines around architectural design. This transversal approach to architectural learning - in which different modules show common aspects- helps students understand architectural design as an exercise of consistency between the different architectural aspects at stake. This facilitates the integration of sustainability issues from every possible angle: technological, social or from a design point of view.

During the first year, workshops 1 and 2 will integrate environmental competences regarding the program of needs in architectural design through the architectural design modules. This way, when they establish a program of needs, students will start considering both the needs of the client and the new social environmental requirements.

In the second year, architectural design modules deepen into the environmental and sustainability criteria introduced in the previous year. While in the first semester the student begins to develop of urbanization and gardening projects, in the second semester they are provided with the necessary knowledge for the accomplishment of environmental and landscaping studies that can produce measures of protection against environmental impact.

In the third year, both workshops of the first and second semester integrate design modules with construction modules, allowing the confluence of contents of both subjects around the architectural project, thus rationalizing the student's work.

The workshop coordinator, before the beginning of the semester, will define the topics and projects that students will do. This way, students will have access to the description of the topics, locations, educational aims and workshop requirements from the beginning, as well as to the plans that will be used in the different modules.

In the fourth year the workshop is extended and the module of architectural design -which has always been demanding on environmental adequacy - is interrelated with Urban Planning IV, which incorporates ecology and sustainability criteria, environmental solutions of conditioning, structures, and installations.

The last school year students find in both semesters three obligatory modules and some elective ones to choose from. Among the elective modules we find *Landscape and Sustainable Habitat*, a very important one because of its special relevance in the environmental curriculum of the architect. This module deals with environmental adequacy issues, conditioning projects, ecology and

sustainability. It will introduce the student to environmental land and landscape planning. This way, students will be able to relate the theory behind design issues –oriented towards the scale and rural problematic- with environmental values, concepts, land and urban planning techniques. The module deals with aspects related to habitat and landscape from a sustainability point of view in its three facets: economic, social and environmental. This is carried out through a practical workshop exercise supported on theory lessons, so that the student goes deep into environmental planning. In order to do this, students will have to become familiar with some aspects and documents of their professional competence such as the study of strategic environmental evaluation, environmental impact projects, or intervention projects in areas of great environmental and landscape value with social and economic complexity.

Final Degree Project. The fundamental requirement for the presentation and defence of the Final Project is that the student should have already completed the 300 ECT credits. Then, after they have successfully completed the final project workshop and have a favourable report from the Evaluation Committee, they can submit the Final Degree Project to be assessed by an examining board.

This analyzed syllabus has been recently approved and this is one of the reasons why one of its main educational aims is developing abilities related to the architect's responsibility towards society and care of environmental problems.

On the other hand Students are not encouraged to study environmental matters in depth as they are always approached in a tangential way in the core modules, and there is little choice of elective subjects to specialize. For the correct teaching of the environmental contents it is necessary to ensure that the teachers have the capacity to integrate the theoretical and technical knowledge in the architectural project proposals, that is, with specific knowledge in fields like scientific, technological, and instrumental development. We find very important in this case to work with teachers in deep about their responsibilities regarding to competences and learning skills to acquire by students in order to be sure that they improve their approach to sustainability by working on their courses programs. In this sense the knowledge base propose by EDUCATE research and the environmental competences to be developed by SAMA in next stages of our investigation would be core opportunities to

confirm this environmental approach of the syllabus.

This proposal can surely take advantage of the different opportunities this syllabus offer us, such as:

- The workshop as the work space for several modules is the perfect environment for students to become aware of the intimate relationships between the factors that affect sustainability in a design project: design, urban planning, materials, constructive typologies, installations, etc. The workshops structure established is perfect to improve relations between departments and to harness the criteria and general aims in an organized way.
- The proposed structure allows students to see from the first year how architectural design consists of multiple factors, sustainability being present in almost all of them.
- As environmental issues are approached in workshops from the first year, sustainability becomes a regular factor when it comes to designing, and the student assumes it as one of the key points that they should take into account from the very beginning of any design or urban-planning project.
- The insistence upon sustainability issues in architectural design throughout the five teaching years makes the future professional more conscious of their responsibility towards environmental questions, both economic and social.

4. DISCUSSION WITH RELEVANT INSTITUTIONS

In order to have a more precise knowledge of major professional initiatives about sustainability in Spain, the CHAMBER OF ARCHITECTS OF SPAIN, CSCAE and SAMA (Seminario de Arquitectura y Medioambiente) opened a nationwide discussion forum. As a result, two meetings were convened attended by representatives of various associations. Some of the final conclusions of these meetings encourage the proposal developed further down. The most important final conclusions in relation to our approach are:

- It seems very important the **empowerment of social perception**, spreading the need to apply the concept of sustainability in architecture and urbanism and facilitate customer access to these issues not intended as an extra cost to the budget.
- The importance and urgent need for the Council and the Architect Institutes to conduct a massive social diffusion of the values of sustainable architecture and urbanism and its tremendous influence and impact on energy

consumption and climate change is emphasized.

- The Green Visa is a service that COAM[2] is developing to offer to society to demonstrate a degree of commitment of certain works with the environment. That means in practice that those projects or buildings with the Green Visa have demonstrated a higher level of sustainable design quality. It is not a compulsory command, but the possibility of having a useful service that will increase the objective value of our productions in the building market.
- Furthermore, it is desirable to align the numerous courses and masters programs with a common basic framework, in line with Bologna guidelines for integration into Europe. This is a great opportunity to unify the groups, institutions, people interested in these topics to research and development level and keep them informed and interrelated.
- The Continuing Professional Development is particularly urgent when we consider that there are currently 50,000 practitioners in Spain, plus another 50,000 who will graduate in the next 5 years. These professionals have no specific knowledge to deal with sustainable matters from these parameters. Therefore we need to address a continental system based on University-based training.

5. NEW OPPORTUNITIES IN TERMS OF COMPETENCES AND LEARNING SKILLS

The current European regulations support all kinds of educational improvements related to the introduction of energy and environmental issues in architecture, although it is not actually demanded by these regulations. The current Spanish regulations permit the proposed necessary change and even promote it by demanding teaching methods which are more appropriate for the needs of today's architectural practice, which undoubtedly include environmental and sustainability issues.

The interest shown at the Escuela Técnica Superior de Arquitectura of Seville –by students and teachers alike– regarding issues related to the natural environment and architecture allows and fosters the creation of an environmental curriculum that includes this kind of knowledge in the teaching of architecture. The Escuela Técnica Superior de Arquitectura of Seville is currently immersed in the process of creating a new syllabus adapted to Europe, which means this is a great opportunity to introduce environmental contents in the structure of the curriculum.

In this sense, the headship of the school is working on the introduction of some methodological changes of the curriculum in order to get closer to the proposals developed by the Bologna Process.

One of the most important initiatives of the headship is to promote the translation of the syllabus of each module into competences and learning skills that students should acquire, instead of contents to be learned. This way, several projects are being carried out with the purpose of encouraging teachers' participation in this task in an in-depth and personalized way. The aim of these projects is to involve the biggest number of teachers possible in the development of the competences and learning skills of the modules they teach, which would ensure in the medium and long term a real and clear development of such competences in terms of professional knowledge acquired.

We believe that, from the perspective of the EDUCATE project, we can take advantage of these initiatives to work on the introduction of environmental and sustainability issues starting from the development of competences and learning skills. This can be the base for the transversal transference of such competences and learning skills to the complete syllabus of the Architecture School.

This way, the process to be followed would be the following:

- Development of specifically environmental and sustainability competences that an architect should acquire throughout the different university teaching levels –undergraduate, graduate and postgraduate. For this purpose, a study parallel to the EDUCATE project will be carried out by means of the knowledge base, which provides and ensures all competences and learning skills linked to environmental and sustainability aspects. This project is also supported by the National Chamber of Architects of Spain, which considers possible that such competences can be evaluated in a later stage as a requisite for attaining the necessary qualifications of an architect.
- Once the competences are developed, we will work on the syllabus of the Architecture School and the teachers will be encouraged to incorporate in their syllabuses those competences which are specifically environmental.
- A group of interested teachers will be selected to work on an in-depth introduction and development of sub-competences for their modules.
- Once all competences and sub-competences are developed (sub-competence is understood

as a competence or learning skill which develops in great detail a specific skill linked to a specific module), we will work with the teachers in the shaping of their syllabuses for the following year. We will then test the usefulness of the knowledge base to provide teachers with the relevant tools to carry out this task.

- This process of incorporating the environmental and sustainability aspects in the syllabus of the School of Architecture of Seville can be potentially applied to all architecture schools in Spain. Particularly, the schools of A Coruña and Madrid are interested in getting involved in the project. The Seminar of Architecture and Environment (SAMA) intends to work on the proposal for the University of Seville and, depending on the results obtained, to work in a later stage with the other two mentioned universities.

6. REFERENCES

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