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The Teaching of Construction and Contemporary Architecture

The spirit of the diversity seems to be a characteristic of the contemporary's architecture; a diversity which rose from the very different ways in which architects are approaching a time of unprecedented freedom in their profession.

The contemporary architecture expresses itself by a large range of forms. The creative freedom has expanded proportionally to the technical progress. Computer-aided design makes it increasingly easy to create unique and sophisticated buildings. Materials too have taken on flexibility unheard of just a few years ago.

The profound change of our civilization is suggesting the need for high level of contextual awareness, questioning, and flexible adaptability.

THINKING ABOUT FUTURE is essential, especially for our students who will carry on their lives and professions in that future.

As a designer, the architect always deals with the future. The anticipatory nature of design seems to be itself a good antidote to any type of future shock. If this has been true in the past, it seems now that the magnitude and depth of change underway makes this argument doubtful.

We use to think of the future as an extrapolation of the past. From this perspective, teaching means to hand down the existing knowledge to the next generation. But the contemporary world and particularly the forecast future do not offer any guaranty for the validity of this logic. In fact, the fast and non-linear leaps we are already experiencing make evident the possibility that the future surpass the most daring extrapolation of the present.

Paying attention to the future means at least two kinds of attitudes within the architectural education.

The first one - not very common - introduces the discussion about the future into actual education. This kind of approach means to bring the future of the architectural practice within the curriculum.

The technological area of the architectural education curriculum, dealing with seemingly cutting-edge subjects - as 'intelligent façades' or 'solar houses' - appears at first sight more conductive to future thinking. But just like other disciplinary areas (including design studio),

it is usually based on past experiences, even if very recent ones. Courses rarely involve any true study of the future and most frequently concentrate in developing applicable skills for the job market of today.

As the role of anticipation becomes increasingly vital for responding to our fast changing civilization, the 'futuring'[1] - based on more or less sophisticated forecasting tools - needs to be formally included within architectural education.

Bringing the future, as a subject of inquiry, within the architectural curriculum does not necessarily means less focus or time for other subject matter. The exploration of the future could be included within existing courses content; the necessary pedagogic ability is to select problems and issues that have within them the seed for engaging the future. This can be done in design studio or in interactive lecture classes. For instance, a class of 'history of techniques' could include an examination of the way the future has been constructed in the past, so that students could understand how the architect needs to address it for facing the challenges of tomorrow.

Perhaps the most important gain in a curriculum that considers the future is the possibility to make students and teachers alike change their mind about the present. Looking at the present with the eyes of tomorrow, its perception of can be significantly modified: what is a problem now, may become an opportunity later; what is an asset today may be a heavy burden tomorrow.

Including a 'futuring' component in the curriculum may also have other pedagogical objectives. For example, it may help students to understand the nature of change, identify the most probable futures on forecasting scenario basis and clarify their implication; it may prepare the students for what is to come while helping them to develop a vision of their personal and professional futures.

'Futuring' also offers a great opportunity to improve traditionally weak areas of architectural education such as externality, integrative activities, interdisciplinary inquiry, alternative practices, etc

From an administrative point of view, bringing the future into architectural education does not imply a revolutionary, but rather an evolutionary movement that directs the objectives, curricula, methods, research and academic services towards the arising new realities. We need to emphasize ways of thinking; making that transcends the norms of today's practice - the limitation of current technologies, methodologies, customs, etc - and focuses on how architectural ideas, representations, building processes, etc, are influenced by the arising new materials and technologies, cultures, practices, etc. This means TO TEACH HOW TO THINK, HOW TO LEARN, HOW TO DEAL WITH PROCESSES AND NOT SO MUCH WITH CONTENTS, because contents are transitory, both in present and in future world. *'Including this type of flexible thinking and learning within a future sensitive pedagogy is definitely not part of ordinary architectural education'*[2] and probably there are few (construction) teachers that

explore this territory within their classes. *'Although their actions do not result in widespread curricular changes, they provide valuable work.'* [3]

The second possible pedagogic attitude means to look at the future of the profession identifying possible changes in the educational structure, in order to 'produce' a particular profile of the future architect. This approach doesn't include any action aiming to incorporate future thinking into the architectural education. It is constructed as a response to the pressing needs of the present and generally refers to the competences and skills that would make the graduated able to practice the architect profession. From this point of view, the simplest example of curriculum 'adjustment' is the incorporation of the computing. Today is almost impossible to obtain a job without at least basic knowledge of computers. Students are being prepared for some of these requirements during their studies by goal-oriented CAAD courses; however, this relatively flexible reaction arms students and graduates with fast design tools, enables them to visualize and model their architectural concepts, and to better communicate with their beneficiaries. But it is not enough to survive in a fast changing world.

The INFORMATION SOCIETY is strongly affecting present labor market, education and professional training, but also family life, habits, culture and leisure, health and politics, hence nearly all fields of our daily lives. Such transformations in society bring about changes in professional practice, new demands upon competences and skills, and, last but not least, change in the way of thinking.

The significance of the information society for individuals - including practicing architects, teachers and students in architecture - does not consist (only) in the use of industrial facilities (digital phones, computers and Internet). It also means a specific swiftness and quality of attitude towards information sources, the ability to select information and to apply it strategically, to analyze it and to know its value. Understanding the significance and the power of information and appreciation of information industry are essential elements for changes in the way of thinking. These changes are tied with the labor organization, but also with the assimilation of new elements into the structure and methodology of the educational process.

Today's students and teachers have many new drawing and modeling tools, new information resources and new teaching supports at their disposal. Students want more from their educators. And teachers themselves are experimenting with new ways of delivering information.

Instead of passive learning, active learning comes to the fore. Students may search for data and programs from electronic databases. With the development of multimedia, educational supports readable from CD-ROM are appearing in addition to the traditional textbooks.

The educational methods based on information technology effectively promote the development of creativity. In contrast to passive receptive learning, these methods are more effective in the study of the theory

of structure, as in the study of the building's physique. The student can better understand the structural design requirements and integrate them into his/her architectural concept, using informational tools for visualizing the state of tension under load. Furthermore, the available informational tools can facilitate the knowledge of the building as a complex environmental control system, which has to respond both to individual's needs for comfort as to the society's requirement for a rational use of energetic resources. (In our Department we have done some small steps in this direction, not only by making demonstrations into classes, but also by using simple software into design studio work.).

The expanding and shifting information (about new materials, products, systems, firms, regulations, etc) that an architect has to manage is a major challenge for his/her professional practice and so it is for the educational process. A solution could be a solid INFORMATION CULTURE formed within the architectural education, with special relevance in construction teaching – may be the educational component most affected by fast changes of the present society.

In the educational process of today the memorizing of knowledge is of decreasing importance and methods of seeking information are gaining ground.

In a world dominated by information, the communication and computing technology enables 'table research' and is fully valorized when used for obtainment, compilation and analysis of strategic information for architectural design (as for other specific activities). This is probably the place where lies the most demanding part of the transition: the increase of information culture using the services of information industries and the consecutive changes in organization of the labor – in the professional activity of the architect, but also in architectural education.

The educational process has to adapt its goals (introducing new competences and skills of the future architect), but also the teacher profile (the teacher is not anymore the person who knows everything, but he has to be an exponent of the new information culture), the teaching methods and the evaluation criteria.

An educational process focused on information culture means understanding of the key role of information sources. Working with them and habitually using information services (websites, specialized databases) should become an important part of agenda of the future architect and has to be a component of the educational process, especially in construction teaching.

(Few years ago our Technical Sciences Department has initiated a project for an information centre in construction, architecture and urbanism – BICAU - financially supported by the National Council for Research in Higher Education – CNCSIS - and the World Bank. The goal was to organize in a complex database system all the available information in the mentioned areas - services, products, systems and

materials, dealers, publications – and to make them accessible to professionals by an informational platform consisting in a portable catalogue and a vertical portal hosted by the site www.bicau.ro. In 2003 BICAU became fully functional. As they are going to do it in their future professional practice, the students can easily accede to the information they need for a certain class or a specific studio design work)

Adaptability to perpetual changes can be achieved by cultivating research aptitudes, as continuous learning instrument. Architectural education, and in particular construction teaching, has to facilitate student directed inquiry, encouraging individual exploration based on well-defined objectives and standards of evaluation, using both traditional methods and modern information instruments. Cross-disciplinary extension is to be promoted defining particular areas of emphasis in accordance with 'hot' social requirements, such as energy optimization, rational use of resources, building rehabilitation, etc

The technological progress inevitably leads to an increasing specialization. More and more sophisticated materials and technologies claim specialized professionals and for the architect this fact means to cooperate with (and coordinate) an increasing number of possible 'specialties' beyond the 'traditional' engineers. That's why the exercise of trans-disciplinary approach, as well as the practice of working in multidisciplinary team is and will be an important component of the architectural education.

The separation between 'design' and 'construction' can be considered the worst dysfunction of the present architectural practice that progressively has hit the teaching, the profession and the society as a whole. It is commonly accepted that in the architectural process there are two phases: the first, creative, depending on the architect's 'fantasy'; the second, practical, depending on the engineer's 'realism'. During the second all-important decision are to be taken: financial, structural, type of materials, technical implants. On the other hand, the increasing complexity of the design is leading to a more and more accentuated fragmentation of the building process, which has to be controlled by the architect, able to integrate several specific requirements. In these conditions, the capacity of the architect to dialogue with and to coordinate other specialists is essential. The architectural education has to reckon with the 'traditional' separation between 'architecture' and other 'specialties'; even if for methodological reasons specific disciplines are separately studied, the school has to teach the student how to re-assemble all the sequential information in a global building concept. This means to privilege the construction not as a-posteriori task for one or several specialized persons, but as a unique moment part of design. (We have tried to re-establish the synergy between design and construction in the student's activity within a design-and-build optional studio coordinated by the Technical Sciences Department; unfortunately it is not a large-scale action, as for administrative reasons it can involve only 12 students)

The way to prepare for the future is not by denying and abandoning the inherited knowledge, but by critically revisiting it, following the two 'traditional' directions of the architectural education: one of them based on the formative role of knowledge, and the other based on the emphasis of the practical utility of knowledge.

The interest for the traditional construction knowledge is presently increasing in the architectural education; it is re-valorized not only as cultural reference, but also considering new aspects of its practical relevance.

First of all, it is the growing sensibility of the society for the cultural heritage preservation and the rational use of the built resources that generate a special interest for the local constructive tradition. The expanding market of building rehabilitation largely demands traditional construction knowledge. There are already signs that in the nearest future the major part of the architects will be involved not in designing new buildings, but in re-designing exiting buildings, considered as re-usable resources.

On the other hand, the present preoccupation for producing sane and 'sustainable' new buildings has broth in front natural traditional materials and traditional bioclimatic building concepts belonging to local cultures. Historic buildings have low energy consumption, climatic adaptability and long life, so the lesson learned from their study is relevant to modern architecture. *'There is no dichotomy between modern buildings and historic buildings – they both are used and abused, and have to stand up. However, it is still not realized how sophisticated traditional building techniques were. Since they have failed to understand buildings as a whole, designers using modern technology have now to relearn many lessons'.* [4]

Unlike traditional materials, some contemporary, experimental, attractive but untested industrial materials and systems may be not so adequate to local environmental conditions and internal comfort requirements; they could imply exaggerated investments and/or constant and expensive maintenance. As an alternative, the constructive tradition represents a rich heritage of knowledge tested in situ for a long period of time. The creative encapsulation and synthesis of the traditional knowledge could help the future graduate to face major requirements of rational use of resources and environmental protection.

As educational method, the exploration of a design concept already materialized into a historic building or the investigation of major technical events that in the past have generated important movements in the architectural expression, can facilitate the understanding of the architecture in a synergic relation with its constructive part and can stimulate the student to mentally repair the artificial fracture between 'architecture' and 'construction' deeply affecting present teaching system.

Furthermore, the survey of the physical decay symptoms of historic buildings, put in relation with the characteristics of traditional materials

and of the local environment, can facilitate the understanding of the building as a process and help creating the aptitude to control the physical decay phenomena in new construction.

New necessary competences and skills are requested for coping with new technical achievements (new materials, techniques, products, systems), new problems to be solved (as environmental protection and sustainable design concept) and shifting orientations of the professional market (between tradition and modernity, between existing building rehabilitation and new building design).

The observation that TEACHING HOW TO THINK IS MORE IMPORTANT THAN TEACHING WHAT TO THINK seems to be the necessary guiding idea of an educational system which intends to produce graduates capable of following the rapid changes of the present and especially of the future, unknown, world.

Under these circumstances, the architectural education and in particular the construction teaching should follow some general principles (suggested by an article[5] written in 1986) aiming to add some new competences and skills to the 'classical' profile of the architect. These principles are:

- To produce flexible professionals, adaptable to varying, uncertain categories of future tasks.
- To emphasize the use of general principles and theories as cognitive devices for organizing, understanding and dealing with changing knowledge; they allow adaptation under varying circumstances and help continuously learning.
- To teach not only 'general rules but also rules for the changing of rules. Teach how to design a theory and how to test it'. [6]
- To teach the 'knowledge necessary to obtain the knowledge needed for a particular project'. [7]
- To stimulate interdisciplinary work and thought into specific areas of design or research.
- To fully integrate in the educational process all the opportunities offer by the information technology.
- To encourage diversity (different individual personalities and opinions, different models and approaches of contents and methods; different cultures, contexts, and individuals), which expands the menu of choices available, but also extends the individual adaptability.

In order to respect these principles, the major changes of the educational process are to be looked for not in the curriculum, but in adapting to new goals the structure of the classes, the teaching methods and the evaluation criteria. The success also depends on the individual flexibility of the educators, their aptitude to accept the challenge, to up-to-date their own knowledge and to permanently look for innovative teaching solutions.

References

1 Term used by Bermundez, Julio, University of Utah, 87th ACSA ANNUAL MEETING PROCEEDINGS, Minneapolis, MN: ACSA Press, 1999.

2 Bermundez, Julio, University of Utah, 87th ACSA ANNUAL MEETING PROCEEDINGS, Minneapolis, MN: ACSA Press, 1999.

3 Ibidem.

4 FEILDEN, B.M., Conservation of Historic Buildings. Architectural Press, Oxford, 1996.

5 Rittel, Horst, Some Principles for the Design of an Educational System for Design. Design Methods and Theories, v.20, n.1, 1986.

6 Ibidem

7 Ibidem