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**Databases for the Complex
Materiality of Architecture
– a training method**

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"Off the shelf" architecture

The present-day architectural practices and building techniques have been in use for a long time, accepted and acknowledged today by an expanding market whose most significant feature seems to be, in Romania, a matter of quantity.

The overall aspect of the newly built mirrors the strikingly limited offer of half finished products and available construction materials: the "off the shelf" architecture. A kind of "ready made" architecture is rising, simply by seasoning the buildings with (not so) various finishing details within a meagre set of products, found everywhere on the Romanian construction market. The only choice required is to pick them out from the other products available "on stock".

The same tendency can be observed sometimes in the choices the student architects make during their design studies. Throughout the theoretical construction courses (building materials, finishing details, building physics etc.) the students get familiar with concepts and principles, formulas and typical details. When it comes to integrate all those acknowledgements into a valid construction element during practical design courses, exercise that must refer not only to the underlying construction theory but to existing, available products and materials, the choices are predictable and resume the references made by the teachers to illustrate theoretical aspects. The students easily and too often end up by using on and on the same pattern for solving different building design situations, once they have found a valid set of materials or products to match the first call. Once they have found a correct way to use a certain membrane let's say to isolate a terrace, their search and study will end up there.

In fact, this can be regarded as a direct way towards simplifying the materiality of architecture, tendency that could be converted into a "do it yourself! but better" attitude. The ubiquitous white PVC window frames and 30x30 cm ceramic floor tiles can be found nowadays from churches and historical monuments to chalets on the top of the mountains. The contemporary architectural product could be enriched if we are able to find a way to show the students, the young architects to be, the real content of the shelf to look on.

The Internet tool

Although the building materials and techniques market does not exceed in dramatic changes everyday, the students have to get used to the idea that it is indeed more complex than it shows. One sure (and becoming more and more easy, even in Romania) way to keep track of what is available throughout the world is the Internet. Producers, manufacturers and dealers post information on the products they have to offer, at various levels of detailing. Members of universities or other third parties develop databases, posting more specialized and structured information. End users communicate among themselves on forums, supplementing the existing information with personal opinions and practical experience in dealing with certain building products.

The way students relate themselves to the technological architectural aspects could be improved profiting by the passion raised amongst the young generation by the use of the computer, chatting and surfing the Internet: better or more com-

plete documentation, the curiosity as a working method, a way of continuous personal training, a method for making a motivated choice.

The student's technological background

During the first academic years, the students learn within construction techniques the theories concerning different basic matters: first contacts with technical thinking as an introduction to the general internal logic of the built shapes, distinctive features of the most commonly used materials and building products, criteria for structural design techniques, underlying principles for elaborating finishing details etc.

The internal coherence of all the technical disciplines becomes visible as an object of study only later in the student's active life. In the last years of study the students are stimulated to patch together the diversity of technical data they possess into integrative curricular activities.

Technological design studios have the most integrative practical approach. Students are supposed to elaborate complex buildings and building systems in a creative way. They are encouraged to use different existing materials and products, making the best of them accordingly to their technical specifications. When a new product or a building material with interesting intrinsic qualities is proposed as part of a construction design detail, paradoxically often it is put into work the same way as a traditional regular one.

In terms of overall efficiency, the students have to adapt the design to the new material situation, in order to have a correct and equilibrated technological result. It means that they will have to thoroughly analyze the materials and products proposed as part of a technical solution. It is not an easy task to accomplish. The technical data usually offered by the dealers or producers is often hard to be interpreted in terms of a correct use of the product.

Problems and deficiencies, different or restrictive fields of application, durability and real life time of the materials and products are non-explicit issues that usually come together with the practical working experience.

The students must be prepared to build for themselves this complete stock of objective technical-practical data. As during the study years they tend to credit with the same value of truth the information from a producer's brochure and the models offered as an illustration of the constructive principles by the teachers, the students must be helped to make the correct connections between theory and the complex realities of a building construction.

Goals and achievements to insist upon

Individual personal working methods are configured during the study years. If the students do not find the time nor the need to search the NET for the latest news and pieces of information, they will hardly start to see this documenting stage as a prime necessity when they will begin the practice as young architects.

Distinct competences are therefore to be built within the first years of construction

architectural study, that is: the knowledge of acquiring complete, accurate and objective data about construction materials and architectural products; in good time understanding of the connections to be established between construction technical detailing design and the available materials and products, that is the connections between basic theoretical principles and their practical translation into a real building.

Methodological steps

1. For a more *accurate and objective knowledge about construction products* the students during first years of study could use the multiple searching options *via* Internet. They will be able to find primary information about the products within the technical documentations offered by the dealers and producers. This first step could lead them to deal with different aspects of specific products, in an integrative way: material characteristics, multiple possible joints, building physics – multiple theoretical issues illustrated by a very specific practical solution. This documentation will supplement the theoretical aspects discussed within different construction disciplines.

Specific to the Internet is the way it stimulates the communication. The discussion forums constitutes a kind of virtual public spaces, where information is exchanged at a rate never met before. Questions revealing different approaches to new materials and products just appeared on the market could lead to unexpected answers, unfolding characteristics and deficiencies, harmfulness and noxiousness, limited use possibilities, and so on. The students should be stimulated to pose questions on discussion forums about different construction products, questions raised from their own theoretical studies or simply to listen to the questions-answers dialogues posted on the net.

Another integrative way of gathering experience is to deepen the study in an intensive search through existing databases. Given a technological building principle or a typical construction material the students could perform comparative analysis in order to structure the information existing on product characteristics from different product ranges.

2. (Re)establishing the *connections between theoretical principles and real buildings* implies in fact finding out real building's features, its characteristics in the making. The moment a construction is built (or a project is designed), it is ready and the owner moves in (or the student gets a mark for the study) – this is the exact moment from which the architect (or the student) begins to know nothing more about his /hers own work. Questions as material durability and the way it grows old are to be posed only when it comes to dismantling or refurbishing. It is partly a matter of theoretical approach but also could be subject of personal interrogation and direct study.

The students must be able to recognize a building's needs in terms of: correct relationship between its overall form and materiality of its building structure; direct relationship environment – envelope – internal comfort; damages of the building due to incorrect choice or a particular way of ageing of the construction materials and products.

New tasks for the students

Both surfing the internet for valuable information and the analysis of existing buildings from the technological point of view are merely training methods for better understanding the complexity the architecture relies on.

The Internet documentation phase is an activity that could be performed within all the building construction disciplines during the first years of study: building materials, building structure, finishing details, building physics. Finding examples of construction materials and products to illustrate various theoretical principles could be centered round typical characteristics, comparative analysis or experienced deficiencies. These individual studies could be part of each discipline as a compulsory paperwork.

Later during the years of study, each student will already have a personal archive of existing products or available materials for better knowledge of what to propose as a translation of the principles into technological design studio detailing work.

The building construction set of features describing a house could be subject of a real 3D analysis of objective data such as its structure and constitutive materials, but also subjective data interpreting internal (dis)comfort due to: material degrading and ageing, structural damages, shape and orientation of the building. For an efficient and creditable result, the analysis could be performed on each individual's home – as a place anyone knows better than any other building. The Romanian specific situation is that more than 70% from the population lives in blocks of apartments with multiple stories. Observing and analyzing this building stock could be useful for better understanding of the reinforced concrete and /or masonry built structures – also disciplines beginning from the first year of study at UAUIM. Bearing masonry walls, reinforced concrete panels and prefabricated beams and pillars, concrete standardized elements with their specific technological construction details could be easily inventoried by the students, their users.

The relation between the inner characteristic of one block's structure, its constitutive materials and other materials finishing the building could be an interesting study within building construction integrated disciplines during the last years. Constructive problems appeared in time could be subject of inventory, trying to find connections between mostly spread problems and deficiencies and the technical solutions used in the original project or through later construction interventions.

All the knowledge and useful observations regarding mass housing characteristic features and properties could be used for supplementing a database initiated on blocks of flats – the product of a research project conducted by UAUIM University.

The practical approach characterizing the latest years of study could offer the possibility to the students to benefit from the digital archives and to deepen the study on the real building features and deficiencies. Observing the problems could lead to finding out possibilities of remedy. The solutions provided could put the student in a position which is quite opposite to everything he is prepared for: he becomes the architect and the beneficiary at the same time. Maybe this could help the students understand the overall implications of theoretical choices they make during construction building design – choice of different materials with different aspects, the problems inherent to construction sites during existing buildings, financial and logistic aspects.

Finally, optimal choices in terms of overall efficiency in the construction design could be seen as major accomplishments of the digital archive and the understanding of the building through its whole life-time.

Logistics /implementation of the new training methods

Like written or digital materials and manuals conceived by the teachers to guide the students through their individual study, it will be necessary to offer them means to have access to digital information such as the Internet and databases as mentioned before.

The Technical Chair at UAUIM University is about to open the doors of a digital working studio. The Internet will be available on the computers we already have and groups of ten-twelve students could work in the same time.

A research project developed in the last years at our University has built a database in construction, architecture and urbanism – BICAU (www.bicau.ro). The information is structured upon a classification of the products related to their place and function within a building. Multiple types of search could pick out materials and products, depending also on the providing or manufacturing companies, code number, quick search using key-words or simply displaying in alphabetical order the classification of the products and construction materials. A detailed description is offered for each product and company (with respect to the Romanian market). Technical documentations are available, and in most of the cases pictures and CAD details supplements the information on a specific product. All items are linked together by similarity principles. From a specific construction material connections can be made to all the materials in the database having similar characteristics and possibilities of use within a building. Also you can find all the companies (hosted on BICAU, of course) that could provide that specific type of material on the Romanian market.

Another research project "The Rehabilitation of Large Scale Housing Estates – An Interdisciplinary Approach" has initiated the building of a digital database for the inventory of the blocks of flats built between 1950-1990, huge number of buildings in a very poor material condition. Teachers from UAUIM and other Universities from Bucharest, together with ATU (www.atu.org.ro) – NGO on architecture and urban planning gathering young teaching assistants from different universities are working together to draw up the complex picture of the living conditions in Romania. The database on the blocks of flats is under construction right now and it deals with technical building characteristics such as volumes and forms, structure and construction materials used, most frequent damages related to different building situations. The accurate estimation on the real number of blocks with similar construction features and their exact position on the territory are still missing but most necessary studies.

Competences to be achieved

The awareness of the possibilities offered by the Internet as a powerful working tool is to be awakened in the earlier stages of student's academic training. The architects-to-be must know how to keep track of all new technical solutions provided by a very

dynamic market. Useful information is not always at hand, a good practitioner or even an expert must know how and to whom to ask questions about aspects not always described in the technical documentation and commercial leaflets.

Sometimes the simple curiosity leads you to other sides, unexpected, of the same problem.

The students must understand that together with a new solution – a new problem could be born. They will eventually end up by always trying to find less convenient aspects about a product (even if all they could find at a certain moment will be its high price..).

Understanding the diversity of the product ranges accomplishing the same theoretical needs is absolutely necessary for a good technical solution. The students will be able to be aware of the whole set of implications their construction detailing solution will have for the real life of the buildings they will design.

Databases will become an indispensable tool for the continuous architectural training, the students getting used to how a database is being built, what could be the aspects to take into account and then how to find them in this type of digital structure.

The investigation of the relation design project – built environment through the understanding of the constructive principles of a well known construction – the student's own home - is supposed to develop the understanding of the processes that lead to a good or a bad behavior of a building.

Although the mirage of newly built contemporary architecture is a strong call, the students have to realize that there are many quite old buildings in Romania having problems waiting to be solved, not only by drastic actions such as demolition. Architecture could be seen by them as a possible new "resource for architecture". Speaking of contemporary architecture, not all the students will have the opportunity to build with last minute techniques or materials. Nonetheless, all of them have to be prepared to offer building designs and architecture of certain quality. Ordinary materials have their own rules of being put into work, the student has the duty to know where to find these pieces of information and to put them together, at the proper time.

As a teaching assistant at UAUIM, being part of the Technical Chair, my working experience with the students is limited and distributed into small pieces. But the chance that I've got (together with the other teaching assistants) is to be able to have an overall look, working sometimes with the same students but with different theoretical or practical approaches. Therefore my proposal is not about another technical discipline, it is a thin but continuous and perseverant intervention in the traditional academic training methods throughout the years of study.

Some of the practical works I have supervised have shown that analyzing and criticizing their own home and then making proposals to "cure" it with full knowledge of the case made the students put passion there where technical aspects were to be considered. On the other hand, the students appreciate the Internet and the information it could reveal, it is just that they do not yet think of mixing together the game with the study.

