

## Some Points about the Teaching of Constuction and the "Charming Power" of Contemporary Architecture

This contribution tries to follow exactly what was suggested by the organising conference and gives an answer to the two questions at the basis of discussion:

1. What competence and skills graduates are supposed to have in the knowledge of technology for architecture
2. What educational methods and strategies are to be adopted

I should like to begin by saying what kind of difficulty are coped today in our school, and in my opinion, in other Italian schools, in teaching technology and construction theory.

The reasons are basically five and are mainly related to the general cultural context in which students find themselves; they are only partially concerned with architecture and the building science.

### *1. The Power of Images*

The images of contemporary architecture (above all the most eccentric and surprising) are more often than not taken as the ideal background to luxury products adverts and they are implicitly recognised by students (who are able to "read" not only the object itself, but also the background) as a finishing goal, as much as the possession of the product itself. Students are continually bombarded and overwhelmed by a huge quantity of architectural images, available in books and magazines, whose only concern is regarding architecture as an IMAGE. They seldom go to the details of the structural elements and hardly ever they tell the reasons beyond a project.

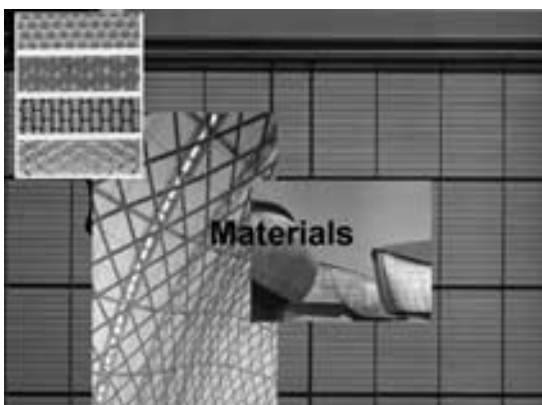


The process which has generated architecture (and its image) is not revealed. The image of architecture seems only to be the result of the architect's will and never the fruit of specific situations which may have inspired (or forced) the architect. As teachers lack data, they find it difficult or impossible to reconstruct the various architecture's routes and to explain the role played by construction theory and technology in the creation of the architectural product.

Two territories are still unexplored or undocumented in architecture journals: the first area is the space between the project sketches and the photographs of the results, whereas the second area is the space between what has just been completed and what happens in the course of time. Apart from very rare cases, however, we don't know anything about buildings lifecycle.

## *2. The Infinite Number of Materials*

Architecture is the only human activity in which materials and techniques from different sources and ages are used without distinction. In architecture we use either the same materials which were used 2000 years ago or the new materials which come from other production sectors (e.g. the car industry, aeronautics, electronics, etc.). Teaching technology is difficult because of these reasons as well: every available material which has increased for 2000 years, each with its own features; the quantity of materials which are blended together in many ways, never in the same place, never for the same customer, never in the same building process; the amount of materials which are "imported" according to the individual designers' choice, without an industrial strategy of development pushing towards definite directions. Architects' creative choices, which are not only realised in forms, but also through the identification of the architecture's essence, increase inexhaustibly the building possibilities, which cannot be taught quickly and easily in a natural architect's vocational training.



Traditional materials as well are constantly rediscovered and reinterpreted to the highest degree: the use of brick covers adopted in Berlin by Renzo Piano is almost obsessive, and his extensive application in brise soleil and in the balconies parapets is a clear evidence.

So how can we give young architects the basic information on how to operate, if technology is out of control?

### 3. The Multiplicity of Languages

All students, and particularly Italian students, are used to living in situations brought about by the overlapping architectural languages which have emerged since 2000 years ago. The skilful ability to overlap and reinterpret architectural languages has been gradually decreasing and the charm of contemporary images might reduce the architect's caution (mainly in the first years' course) needed when their design is realised in a city. Too many times they just want to do something visible ending up in glass and stainless steel projects, devoid of any perpendicular lines, completely unsuitable for the context in which they should be inserted.



Christian Schittich said: "Leafing through international magazines, one gains the impression that no building material, no form of application is too abstruse for facades". This was published in *Detail*, a German journal concerned with all kinds of innovations in technology and form relating to architecture and not only in Germany.

Nearly mimetic net envelopes, with suggestive night effects, subtle plastic slabs in pastel colour, repeated writings, signs imprinted on a huge variety of materials, metal cages filled with stones, iron sheets, recycled waste, iridescent glass and else. This pluralist, media-oriented and computerised society is revealed through surprise, in the amazing use of "foreign" materials (at least so far) to construction or peculiar to other kinds of construction. The most important examples may be the cages used by Herzog and De Meuron for the Napa Valley's cellar in California or the coloured polycarbonate for the Laban Centre. They have developed a fashion, they are "trendy" (again in the words of Schittich) and have been adopted some months or years later, virtually metabolised, in projects published on the pages of the same magazines which had published the "original" ones. On the other hand we live in a period in which the senses are constantly bombarded with increasingly stronger stimuli and designers are urged towards sensationalism in order to attract people's attention, to compensate their clients' investments with stronger images.

Finally transparency is often confused with lightness, and sought as much obsessively even at latitudes where it must be controlled, regulated, reduced by serigraphs, curtains, bulges, gratings and so on. It seems mostly a useless expensive formal performance (now usual and tired), rather than a real technical-functional need of the buildings.

The borders between formal and technical search and the effect surprise search, the innovative covering at all costs, the smart "packaging" is increasingly subtle and fragile.

#### *4. The Influence of Computers*

We have user-friendly and intuitive equipment, compatible with students' knowledge, who aren't afraid of computers at all. Computers grant an extraordinary freedom to conceive any form without restraints, by virtually manipulating it so realistically as to deceive the careless eye. Arata Isozaki, in a recent lecture at the School of Architecture in Genoa, has discussed the relationship between architecture and the computer, between "analogical" and "digital" architects. He described as "Photoshop architecture" that kind of architecture where the skin is like a veil pulled tight on a mysterious and obscure structure, which is scarcely understandable and even less feasible, so that specialised engineers must perform acrobats. So architects empower the computer to create and manipulate forms without awareness, maybe at random, by exploring the infinite number of possibilities offered by the software, as it was a video game. So lecturers find it difficult to single out realistic renderings and to understand how complete and responsible are the projects involved.



#### *5. Fashion*

Finally fashion in architecture plays a leading role in moulding and directing students towards unaware choices from a technological-structural point of view. When "high tech" and "post modern" go out of fashion, new tendencies will come out. The search for an environmentally friendly approach (a pretext sometimes used to justify eccentric choices in technology and form), and the search for building solutions which can limit the energy consumption by using all the resources offered by nature on the spot, are often inevitably a matter of fashion where the protagonist is a well-explained difficult mechanism with red and blue arrows and yellow sunrays.

It seems well-founded now that double building envelopes can be considered sustainable, at least as far as energy is concerned. At first they developed in northern climates (mainly in Germany) but some experiments and achievements have shown their good performance even in hot climates. The results of an experiment issued in the proceedings of 2003

Glass Processing Days Suitability of Dual Skin Glass in Hot Climates, GPD Conference Proceedings, Tampere, Finland, 2003) show the possibility to expand some buildings glass surface, e.g. offices, in Kuwait (where the trend of glass-made buildings is the same tested elsewhere) by respecting the limits imposed by local regulations about electrical consumption for conditioning. Nothing is told about the inside brightness whose degree may be intolerable and which is likely to require venetian blinds, curtains, gratings, brise soleil and the like, with an energy final balance to be worked out. It reminds us of SOM's skyscraper in Jeddah, little known but genial, built in the 80ies, a clear proof of how a foreign designer can think of a solution which fits the place (with reference to climate) compared to a native designer's attempt of conforming to global fashion.



Double building envelopes seem the right solution, at least where they are developing, to the contradiction aroused by skyscrapers, which are not environmentally friendly but which keep on existing in the customers' idea of self-representation (corporate buildings). Foster, Rogers, Piano, Ingenhoven, Murphy and Jahn, among the others, in their effort to reduce energy costs follow this direction, even though they are not formally asked for by their customers. As Ingenhoven said during a lecture held at the School of Architecture in Genoa, their attitude is simply one of etiquette (a "bon ton design"), typical of those who join the same competition, for the same clients and who often share the same consultants. The search for the most effective system of wind pick up and for the exploitation of the atmospheric pressure differentials have turned some building into textbook examples, celebrated in architecture magazines (Foster's "pinecone" in London and the Commerzbank in Frankfurt, Sauerbruch and Hutton's coloured GSW in Berlin, etc. ). They seem to show that such costs as heating, cooling and ventilation may be notably reduced with the help of users who will not have the usual climatic excesses (i.e. too hot in winter and too cold in summer). All this is constantly monitored (at least as far as we know through literature); it would be interesting to assess the situation within a few years, assuming that we can remember.

### **What competence and skills graduates are supposed to have in the knowledge of technology for architecture**

The most important requisite graduates must show is AWARENESS. They must be taught somehow to be responsible of the building choices they will

make once they are architects. Being aware is also realizing that the design process is an activity oriented to problem-solving and not a simple and uncontrolled game of imagination. Creativity in architecture is like in all human activities; the architect's imagination can't help coming to terms with the concrete feasibility of the project.

Being aware is also a balance between what science and technique can give an architect so that he can master all the information he's got and the risk of being overwhelmed by it.

Young architects must know there are countless design spaces among the initial idea of a project, the executive project; in addition the building process and these spaces cannot be left to technologists, experts and specialists. For instance, what do "design specialists" (façade consultants and glass specialists) do and how do they mutually interact? This aspect in the design process (which is more and more taking shape as a complex mechanism similar to a brain-teaser without a solution) deserves careful analysis because it gives architects new chances and indicates a new relationship between the designer who creates the project and the specialist-designer who affects the form through his technical and constructive learning, who looks after details and how it works, and assures the result. These consultants claim their right to be involved in the project since its initial phase of design in order to make the most of their knowledge. It is not easy to define how the design process changes, how the chain of ideas takes form, how the constant revision of solutions occurs, whether they depend or not on external consultancy which stands for basic scientific and technical knowledge for deciding the initial line of design (with reference to the problem of natural ventilation, solar exposure, shading, natural lighting, etc.)

We often hear that consultants are not a threat to designers' independence, that they do not manipulate their solutions, or rather that they are creative consultants who are to cooperate on the process of technical development of design. But they often turn out to be those who find precise solutions (they are closely connected to production), and not simple applications to technologies or imitations of standard products from one project to another. They look like specialists of "variations on a theme" and in fact by comparing a few projects it's easy to understand that many variations exist on the theme of the spider, the kneecap, and else which can be typologically brought back to the first solutions by Peter Rice. Rich customers who want great glass facades ask for "haute couture" solutions and not catalogue stuff.

### **What educational methods and strategies are to be adopted**

What students are taught first is that there isn't a chronological order between the initial idea of architecture and the form it takes through technology. The project, since its first phase, must have a potential for constructive development. The initial idea, even the most sketchy and superficial, must include the image of its concrete aspect. This clashes openly with design teaching methods in Italian schools of architecture because of three reasons:

- There is exaggerated theoretical knowledge, above all in the first years, which is not learned by students because too far from reality. The deductive method supremacy and a virtually absent inductive approach takes away theory from practice.
- There is poor integration of knowledge and subjects, which are taught as separate worlds and don't regard the project as the time of cognitive synthesis (this seldom happens only in the last years of the students' education, or when they prepare their university career final project).
- There is a strong tradition, at least in Italy, to teach architectural design mainly from an aesthetic point of view, leaving out the building culture.

In the first years of their university career students have to take courses aimed at highlighting the role played by construction, technology and the building site in architectural design and they are asked to understand that the building culture and technique are the essentials to the project, whose absence may turn technique into a system of obligations, ties or obstacles forcing its way into a project conceived in the abstract.

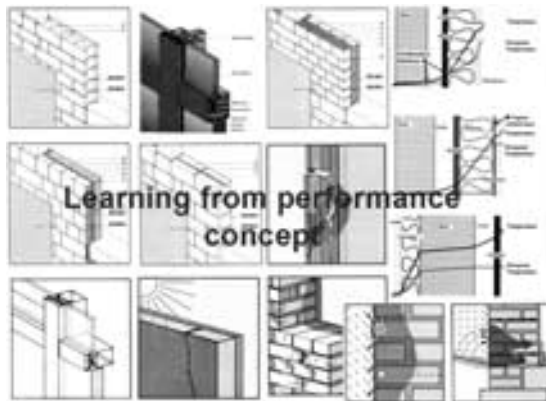
To reach this purpose technology and construction teaching are organised in three ways:

- by exploring architecture in order to discover the role played by construction in the design process. This activity takes place by "dismantling" some famous architects' buildings of different historical periods, from the Romans to contemporary architecture, assuming that the building process can be entirely documented. An example which is often dealt with in class is the house by A.Perret in Rue Franklin 25, one of the first reinforced concrete buildings in the history of architecture.



- Through the teaching of the idea of performance concept applied to architecture. It is perhaps an outdated approach which recalls the research into building industrialisation in the 60ies and 70ies which have been abandoned, but it seems to be the only one, as I see it, which can give students scientific elements to make a choice without having encyclopaedic knowledge of the building materials used in a project. The more material and formal possibilities increase, the more

teaching possibilities decrease. We have to replace notional teaching with "behavioural" teaching, that is education to architecture.



- Through experiments based on "learning by doing" in design workshops. They are organised as a sequence of multiple short meetings (at present they are four and they last from 3 to 7 days) whose goals are progressive and contents gradually difficult. Simple subjects make it easier for students to get information besides enabling the teaching staff to follow up the students' progress in their projects, which can be explained and discussed naturally. Meetings start with the explanation of materials properties in order to make a simple object (a prism made of cardboard, poly-carbonate or perspex slabs with simple joints) go on with the teaching of structural properties (a thin vertical structure or a small metal or wooden footbridge), then with the perceptive properties and in the end with a real construction or a substantial part of it (the roofing of an archaeological site, a new facade of an old building, the outside of a restaurant, etc.).



Renzo Piano, who is much loved by our students, has recently declared at the opening of his Genoa's exhibition that architecture is the longing to disobey, to rebel, to go beyond the known but with great competence and cleverness.