

**Initiations** |—————

# EAAE-ENHSA Thematic Sub-Network: The Teaching of Construction in Architectural Education

Maria VOYATZAKI  
EAAE-ENHSA Construction Sub-network  
Coordinator

## Debating on the Teaching of Construction

In the last decade a great number of Schools of Architecture in Europe reconsidered and reformed the structure of their curricula. In the context of these reforms, a radical re-allocation of teaching time took place, a number of new subject areas were added, the importance of some other subject areas was diminished, and new forms of specialization were introduced to architectural education. In this decade there is an overall re-definition of the profile of the architect in contemporary society, which may influence the educational strategies in order for this profile to be ensured.

One of the issues that seems to have an increasing interest in the debates of teachers as well as of the management of schools is the teaching of construction in architectural education. More specifically, this issue has three complementary dimensions: the first one concerns the contemporary content of the teaching of the subject area, the second one concerns the qualitative and quantitative position of the subject area in a school curriculum, and the third one concerns the accomplished methods for the transmission of the knowledge of the subject area.

The main characteristic that could be distinguished behind these debates is that the present teaching methods and practices of construction are widely questioned. As these methods constitute transformations and adaptations of educational practices implemented on the education of the architect in the post-war era, there is an increasing demand for a radical reconsideration of these methods so that construction teaching can become more compatible with the contemporary trends of architectural theory and practice.

The questioning of the effectiveness of the position, the content and the pedagogy of construction appears implicitly and explicitly in every debate on architectural education. It is interesting to note that a great number of reforms in schools of architecture in Europe have attempted to interfere with the teaching of construction, always with the perspective to stress out its importance and to point out its role in the education of an

architecture student. An attempt to record this tendency became apparent at the International Conference in Plymouth (organized by the EAAE and the School of Architecture, at Plymouth University, UK, 4-6 February 1999 entitled 'Architecture and Engineering: Teaching for a Multidisciplinary Practice'), where the necessity for a convergence between studio design teaching and construction teaching dominated the majority of the interventions made. It was stressed out that this convergence should occur through new forms of organization of school curricula, through the restructuring of their contents as well as through new teaching methods. Four years later, speculations on the subject seem more articulate, organized and oriented towards a new pedagogic ethos and a new belief that construction should be part of the entire body of knowledge an architect should possess. In this context, a particularly important objective is to further clarify this new condition of construction teaching and reveal its characteristics.

## Towards a New Construction Culture

The question that arises is whether it would be possible for some characteristics of this new orientation of construction teaching to be noted, given the plethora of pedagogic approaches as well as the richness of the dynamics of contemporary reforms in architectural education. Such an attempt would be a particularly difficult task given the numerous proposals but also their heterogeneous departure points (geographic, age, and cultural particularities as well as views on architecture...). Nevertheless one could take the risk to suggest a number of characteristics which were not part of previous approaches to the pedagogy of the subject area, and which seem to form a new basis on which, what we could call, a new construction culture may bloom.

The first characteristic is that construction appears not as a merely technological knowledge serving architecture, as a means for its spatial expression. Construction is now perceived as a broad domain which combines history, the development of techniques, the relationship with the social and economic context and

for this reason should be a vital part of the way in which we think of space. Construction appears as architectural culture, deeply rooted in architectural knowledge and experience, as a genuine part of the general contemplation of architecture and its social, economic and cultural role.

The second characteristic of this shift of paradigm which derives from the first characteristic is the fact that the new construction culture is increasingly perceived as a handling of freedom rather than a handling of constraints. The knowledge of materials is pursued so that the students, and hence the future architects, become familiar with the context in which their design ideas and choices will be made or in better terms the context in which they will stretch their experimentations to their limits. On the contrary, material is proposed as a means for expression, its choice acquires meaning. It is no longer a choice of a means to serve form. This way of constructing or rather materializing an idea has meaning itself. Along these lines, the knowledge of construction must free designers to work with imagination, must drive their inventiveness but also must determine the materiality of their ideas from the conceptual stage of the design process.

The combination of these two characteristics leads to two new approaches of architectural education, which in turn have two characteristics of this new paradigm. The first one concerns the demand for integrating construction in the design studio and for gradually disassociating it from the isolated role it had in school curricula up until now. Construction teaching is no longer a peripheral knowledge which, as isolated and introverted, articulates a programme of subject modules with an inner logic, its own coursework, committed to assist design whenever that is necessary. On the contrary, construction is suggested to constitute an integral and inseparable part of the design studio not as a contribution to it when necessary, but as an active parameter of the formulation of values and ideas of an architectural proposition and the subsequent decision-making of the design process.

The other approach which constitutes the fourth characteristic of this new paradigm is the tendency of the 'de-mathematisation' of construction teaching. It is suggested that the body of knowledge of construction should be freed to the greatest degree possible from mathematics and calculations and to transform to a new construction logic, which -as commonsensical (while inventive) and not as precise in terms of its well-calculated dimensions, as a perception and not as an

equation, as a form and not as a shapeless material- integrates with the thought on architecture and the way(s) in which it is justified and well-argued, or in other words in the way(s) it forms architectural discourse.

All these characteristics describe a shift to a new way of contemplating and formalising the teaching of construction. A process that no longer follows a schema which is typical of the Modern Movement, linear and attached to the analysis-synthesis-evaluation stages, but introduces new terms such as 'holistic', 'integral', 'inseparable'. The teaching of construction begins to appear as a game or a 'play' with materials and techniques, the imagination, the unknown, the new which is always accompanied with the satisfaction of creativity and the pleasure of creation. Could we actually argue that construction teaching in some schools shifts from a learning-by-studying and learning-by-being-taught to a learning-by-doing process or rather to a learning-by-playing one?

### **Structuring the Contemporary Paradigm of Construction Teaching**

The perspective of a research project to investigate and define this new paradigm seems to be a particularly complex mission. The creation of a network of specialists in teaching construction was considered an opportunity which could offer insights, and could undertake the mission of elaborating on the contemporary profile of construction teaching in higher education. Like any other process that has no precedent to learn from, the creation of a network of teachers of a subject area in architectural education is a tentative process. This process is charged with more meaning and increased difficulty with its ambition to last, to have a method, a philosophy, a vision, a perspective, a future and to be effective to its members. What the members of the network definitely share, like all teachers of Higher Education, is that there is no systematic education on how to educate in higher education. Even if in a school teachers consciously or unconsciously exchange pedagogies and learn from one another while in action, what happens in other schools remains unknown. The difficulty is even greater for subject areas which sit on the border between subject areas. Construction happens to be one of them as it sits between design, history and theory of architecture and construction, and the building sciences.

The creation of the network of construction teachers had to find an environment in which to flourish. The EAAE

(European Association for Architectural Education) and the Socrates funded Thematic Network Programme, ENHSA (European Network of Heads of Schools of Architecture) acted as the supporting environment for the development of this research. The physical environment for the first meeting of the Network was offered by Aristotle University of Thessaloniki, School of Architecture. With the title 'The Teaching of Construction in Architectural Education: Current Pedagogy and Innovative Teaching Methods', fifty participants, representing thirty five European Schools of Architecture responded to the invitation and gathered in Thessaloniki between 30 May and 1 June 2002 to commence work on the Network. The present volume describes the entirety of this work and is offered to the reader as a starting point but most importantly as an invitation for cooperation on, and contribution to the future activities of the Network.

The organization of the debate on architectural education is a complex task. This debate is often spread on various issues resulting in losing focus or it shifts into a broader discussion on architectural education usually with no return. In order to prevent such deviation the debates were organized around four basic questions in relation to the teaching of construction. Each one of them corresponds to a keyword which makes it easier to relate to. These keywords were:

- a. 'What and Why'. The debates focused on the content of construction teaching, the types of the themes chosen, the priorities set and the choices made, the principles governing the organisation of construction courses and the educational objectives when construction courses are designed.
- b. 'How'. The debates focused on the pedagogy of construction, not only the teaching methods in terms of effective knowledge transfer but also its synergy with other subjects that are part of a school curriculum, with emphasis on studio design teaching. The central question was whether construction could be taught in the design studio.
- c. 'Who'. The debates focused on the construction teacher's background and profile.
- d. 'When, to What Extent'. The discussion focused on the distribution of teaching in the duration of the studies of an architect. Participants discussed the time in a school curriculum in which construction should be introduced and elaborated on, and the extent to which this should happen. Moreover, discussions focused on how construction teaching

could be related to, and integrated with the teaching of other subjects in architectural education.

- e. Dynamics and Tendencies. In the last session there was an attempt to compile all other sessions in order to draw conclusions towards directions in which schools of architecture can move, emerging models that are or could be applied in the pedagogy of the subject or ways of mapping these models. In the context of this discussion the future of the network of construction teachers and its future activities were also scheduled.

### **The Volume**

The present volume is organized in four parts:

Initiations, the first part, consists of the present brief introduction which includes four interventions all delivered from the host institution (the present introduction by the EAAE-ENHSA Construction Sub-net work Coordinator, the second one from the ENHSA Project Coordinator, Dr C. Spiridonidis, the third one by Dr. Em. Tzekakis technology professor and the fourth one by Dr. D. Kotsakis, School Curriculum Coordinator).

Conceptualisations, the second part includes three stimulating positions on the subject. The first position was put forward by Jeremy Gould from the School of Architecture and Civil Engineering of Bath University, UK, entitled 'Poetry and Plumbing / Reality and Dreams'. The second position was put forward by Cyrille Simonnet, from the Institute of Architecture, University of Geneva, Switzerland, entitled 'Construction and Illusion'. The third position was put forward by Susan Dawson, the editor of the Working Details Handbook series of the Architects' Journal, UK, and was entitled 'In Detail - How Architects Think About Construction'.

Articulations, the third part consists of the papers that were written by the network members as answers to the five questions posed and the posters that correspond to the graphic output, or rather to the student works that each Schools produces.

Expectations, the fourth part consists of the debates on the aforementioned themes. The fourth part of the Workshop also included an exhibition of two A0 posters produced by each participating School with a graphic output of students' work on construction. Despite the attempt to transcribe with accuracy the debates from the workshop, the editor wishes to apologise in advance for any inaccuracies of the interventions of individuals that could be attributed to the quality of recording.

Last but not least, what could be otherwise the fifth part of the network meeting output was an exhibition with the title 'In Detail' - A Selection of Architects' Working Details from The Architects' Journal' organised by Susan Dawson, which due to technical difficulties does not appear in this volume. All four parts of the meeting but most importantly the active participation and the constructive debates of the participants raised very intriguing issues on the teaching of construction.

The ambition of all members of the Network is that it will open up a new era of people sharing the same professional interest and concern, that is, the teaching of construction. It was generally admitted that this meeting for the first time was at least useful in terms of getting to know people and having a first picture of the state-of-the-art of construction teaching in general. However the need for tying the bonds with more workshops and for focusing more on the pedagogy of construction was expressed.

It would be an understatement to assume that it is difficult to summarise in a few lines what was a rich experience like that of the live encounter of teachers of construction. With that in mind a conscious decision was made to leave space to the individual reader of this volume for personal interpretations and attributions through accessing the raw material of the encounter.

In this volume it has been confirmed that a great number of schools of architecture in Europe have already started to work on forming and introducing to their curricula this new construction culture. What remains to be examined is the methods which will enable this new paradigm to flourish; the ways in which the construction knowledge itself is explained and transmitted to, and memorized by students, as well as the ways in which the operational potential of a construction exercise is ensured.

By committing itself to meet in the spring of 2003 to thoroughly examine these methods, the Network demonstrated its appreciation and acknowledgement of the operational value and importance of this encounter in its efforts not only to create a network of construction teachers but to advance the pedagogy of the subject matter.

# Towards a European Higher Architectural Education Area

Constantin SPIRIDONIDIS  
EAAE-ENHSA Project Coordinator

## 1. The Framework

In May 1998, the Sorbonne Declaration, as this was signed by the Ministers of Education of France, Germany, Italy and Great Britain, scheduled procedures towards creating a European Higher Education Area. A year later, the Bologna Declaration was signed by all Ministers of Education of the EU member states introducing a European system of studies in Higher Education with which all Higher Education Institutions are invited to comply in the next ten years. As it could be expected, these political initiatives have opened up debates and in many cases they have provoked radical transformations in many European Higher Education Institutions.

## 2. The Issues Perspectives and Problems

The perspective of the creation of a common area in Higher Education across Europe has not been perceived in the same way by all schools of architecture. Many of them have seen these policies as a good opportunity which will facilitate them to abandon dated educational practices and look ahead. They believe that through their modernisation they can ensure a better place in the international competition of schools and the subsequent diplomas awarded, and they will thus acquire a contemporary European identity, useful and necessary for their status. Unlike these schools, a great number of schools encounter with scepticism the implementation of a common system of studies. For them this perspective is seen as an imposition which threatens their autonomy, a virtue that has been defended by the European University as a fundamental presupposition for its existence. According to their expressed views, they find it difficult to recognise the obvious benefits and advantages of such change and therefore delay the reform of their education practices which are structured around the cultural and economic dynamics.

In any case, however, there are common and imperative issues on the architectural education of today in Europe such as: The preservation of the identity and the particular characteristics of each school in its particular

social, cultural, academic and legal context; The compatibility of architectural studies and the subsequent diplomas awarded. The definition of widely accepted criteria of quality assessment and assurance of architectural studies. The facilitation of student, staff and ideas mobility among schools. These issues address a number of questions to which schools of architecture are invited to respond through innovative proposals, with new programmes of studies and new educational practices as well as through new administrative and managerial initiatives and policies. In this context, it becomes apparent that it is necessary for schools to undertake reconsidering their future collectively and to collaborate in order to define together the new objectives and to choose the strategies which will enable their fulfillment.

## 3. The Debate

In the last four years, schools of architecture in Europe have started the discussion on the future of architectural education in the institutional framework as this is promoted by the European Union. Since 1998, the European Association for Architectural Education has taken the initiative to organize this discussion with annual meetings. Four of these meetings took place and formed a continuous milieu for dialogue and exchange. Some of the points of these discussions could be summarized. One of them is the fact that the interest increases with the same rate that points that need clarification appear, with regard to the type and the extent to which this new institutional framework invites schools of architecture to introduce changes. Another point is that schools of architecture in Europe stress out the necessity for a systematic and analytical dialogue between them in order to allow for the tendencies to surface and the constraints that are imposed by the local social, cultural and legal contexts to become known. The third point is that schools of architecture in Europe become increasingly aware of the need to confront and see their future together and to proceed to the restructuring of their curricula with the highest degree of convergence in mind and agreements in operation. The fourth point is that there is a strong demand of schools

for more systematic and analytical information collection and dissemination on architectural education in Europe.

Various initiatives have been taken in the direction of creating a common area of higher architectural education in Europe which are based on the agreements that have been made from the debates between schools in the last four years. The most important of these agreements are:

- That the ECTS system is of vital importance for the development of student mobility, the organization of ECTS credits and the flexibility of programs of studies, necessary for the preservation of cultural and pedagogic polyphony which is considered a very important characteristic of the architectural education in Europe.
- The studies that lead to the Diploma in Architecture, which in turn ensures access to the profession of the architect should last at least five years and correspond to 300 ECTS credits which lead to education at Masters level.
- Pursuing a comparable and flexible set of skills, every school of architecture can decide and organize its studies either in an inseparable programme of studies or to break it in two cycles (3+2 years or 180 and 120 ECTS credits respectively) the first of which alone cannot allow access to the profession of the architect.
- The development of a European system of 'academic' evaluation and quality assurance of programmes of studies in the framework of the academic community is particularly important. A system which should be adapted to the needs of architectural education and would respect its existing pluralism.

#### 4. The Initiative of the Network

Since 2001-2002 academic year the discussion on the future of schools of architecture in the framework of a Common European Area in Higher Education has become more formal and institutionalized as it has been incorporated in the activities of Socrates, or more specifically in the activities of ENHSA Thematic Network. With this Programme schools of architecture that took the initiative to form this network as well as all other schools of architecture, members of the EAAE, develop a series of activities which aim to support the creation of a common European framework for architectural

education.

The objectives of these activities are:

- The collection, processing and dissemination of data and information, which will support the decision-making processes on the restructuring of the curricula.
- The elaboration of proposals regarding the adequate teaching time and the content of studies of specific subject areas as well as of new strategies and teaching methods.
- The propping of the coherence of Schools of Architecture for better academic cooperation and more effective management of academic issues in the perspective of reforms.
- The collection and dissemination of new educational practices and pedagogic methods.
- The cooperation with other International organizations and professional bodies.

#### 5. The Construction Sub-Network

One of these activities is the creation of thematic sub-networks which focus on subject areas of architectural education. The objective of these sub-networks is to investigate and record the ways in which different subject-matters are taught (content and pedagogy), the ways in which they are positioned in school curricula of schools of architecture in Europe, the time each school dedicates to the teaching of the subject matter, the profile of the teachers that undertake the subject area teaching. It is expected that this record will reveal trends, tendencies and dynamics, and will define a broadly accepted framework for the teaching of the subject area in a compatible teaching environment as part of the Common Higher Education Area in Europe.

This volume records the first meeting of the construction sub-network. This encounter was the first step towards the investigation in tendencies and dynamics of the subject matter pedagogy. It is offered to all schools of architecture in Europe not only as a first attempt to record the existing tendencies but as a challenge for, and invitation to, enriching and completing this debate with new ideas and views on the teaching of construction in schools of architecture across Europe. It is the conviction of all those involved in this effort that this volume will be a useful tool for the support of construction pedagogy.

# Teaching Architectural Technology

Emmanuel TZEKAKIS  
Professor, School of Architecture, Aristotle University of Thessaloniki

## Introduction

The target of organising an international meeting on the topic of teaching Architectural Technology at our School is not to demonstrate what exactly we are doing as a Department of Architecture, but to open, if possible, a discussion on the predominant points of view all over Europe on the subject of Architectural Technology. These days we are witnessing an extensive process of reconsidering the way to approach the teaching of Architectural Technology. We've still got the chance to integrate ideas and directions, using the existing experience, positive or negative, of other Schools.

In the last few years the teaching of Architectural Technology at our Department of Architecture is undergoing a systematic change. There is a transition from a large number of modules with a specific subject offered by individual lecturers to a smaller number of modules of a more general breadth of knowledge with the participation of a larger number of lecturers, so to say a Technology Team.

Today a team of 8 lecturers carries out Architectural Technology modules covering a full two-year period stretching from the 2<sup>nd</sup> to the 5<sup>th</sup> semester. These modules are practically obligatory for all students. Other, parallel modules are given individually by various lecturers, which are optional for the students to choose, so they can enrich their breadth of knowledge.

Obligatory lessons on Architectural Technology mainly focus on bringing Design and Construction together rather than trying to demonstrate the entire field of Technology, Building Physics and other relative subjects. It is also a common knowledge that this field is quite an unstable subject due to constant changes year after year. Behind this endeavour lies the notion of helping the architect comprehend that Design and Construction have to be dealt with as a neity.

The effort lies in helping the student comprehend that his projects, which are often developed up to the stage of Design without an in-depth examination of the technological and constructional restrictions imposed by reality, are in danger of being altered beyond recognition at the next stage of planning, which is the

preparatory stage for implementation. We begin with simple things, such as the real dimensions of various building elements- mostly the ones an architect rarely takes into consideration- and we go on trying to integrate intensive experiences, like a visit to the building site, where a student is able to conceive dimensions and shapes constituting a project.

We probably are amidst a long and arduous effort to improve things. We hope that with the interaction between Schools and the exchange of experience we will be able to establish a forum to help us find ways to better teach Architectural Technology and also Architecture in general.

## Main Issues

Of the multitude of interesting and significant issues put to the debate by our colleagues during the session of the ENHSA, held at our School, I chose the following issues, which met a wide acceptance, to comment upon.

## The Object of Technology

The object of Architectural Technology is more or less well known, widely accepted and concrete. The options of the many different schools vary very little and hence this issue rarely constitutes a subject of discussion.

The need to unify Construction and Design and the problems emerging from the common way of viewing these two as distinct - in contrast to the view, which regards them as a whole and should be promoted- are beyond doubt.

The main question is how to approach the subject of Architectural Technology. From this one rise lateral issues, such as the amount of lessons, their position in the Schools' Curricula, the interrelation with Design and the ways to establish a required minimum of knowledge taken in by the students.

The debate on such an issue, which practically concerns all Schools, brought forward a number of well known and also some less known truths. Although certain topics like Design, Construction, Technology, Town Planning

and History are a matter of course in the Curricula of all Schools of Architecture, there is an uncertainty as to the identity of the above topics and their relation to the Architect's work. Moreover there is a (natural) tendency of each and every team of lecturers to think of their subject as the most important, granting other subjects a secondary role. As a result of this, the student is unable to judge the relative weight and value of each topic in his studies. What is even worse, in a School like ours with a large number of courses and options, the student is confronted with over 150 'equally important' courses offered by 100 lecturers 'of equal value', yet is left without a single hint about which one is of primary importance and which one comes next. The consequence is that priorities are often determined by secondary and often irrelevant factors, such as competition among groups or individuals, persistence for tradition and particularities in the corps of lecturers. It is obviously necessary to avoid such extreme situations and to come to a consensus for the benefit of the students.

It is also evident that the authority of Schools to define the content of studies on the basis of academic criteria leaving aside criteria concerning the ability of their graduates to find employment emanates from their financial independence, the future of which lately appears quite uncertain. The willingness of the state to keep on sponsoring public high education is being disputed by facts of real life, despite ongoing assurance on the part of the administration. Even a rudimentary differentiation in this status of financial independence will dramatically disrupt the current picture.

### **The Objectives of Studying**

Another important issue appears to be the equilibrium between 'education' and 'training' of the students. The term 'education' describes the transfer to and the comprehension by the student of knowledge traditionally related to the science and the skills of architecture. Education offers general scientific tools, not always connected directly with the current architectural practice, yet being of constant value and scientific importance. Training offers to the student abilities to deal with current demands of architectural practice. Still this training is not of significant scientific importance and is of rather temporary value. Because the duration of studies cannot be extended ad infinitum to allow students educate and train themselves at the same time, one must choose between the option to create architects of broader education but unable to face practical problems and the option to have well-trained

architects but unprepared to permanently keep track with scientific developments.

Worse still, these options are often left to the students themselves. Students are granted a great freedom of choice regarding the curriculum of studies with reduced responsibility on the part of the school as to the outcome. The weight of the consequences of these choices is rarely made clear. Besides these choices are influenced by random factors, such as hearsay, 'easy' options, subjective or erroneous viewpoints on the quintessence of lessons, misleading titles of topics, etc. The most crucial of these factors are the teachers themselves. Therefore establishing incentives towards the right direction to overcome the aforementioned difficulties in a positive way is a key-point as to the quality of studies.

Another interesting issue mentioned during the debate is the ability to construct. This implies skills in design, planning etc. and also the ability to coordinate a team of engineers, contractors, supervisors etc. The latter requires a broad field of knowledge, stretching far beyond architectural skills alone. The above considerations lead to the conclusion that an architect, after completing his studies and before being granted authorisation to construct autonomously, has to undergo a period of training in a non-leading capacity, in order to acquire experience in teamwork under real conditions. This real-life teamwork unfortunately has nothing to do with teamwork within the framework of university projects.

### **Teamwork**

Like all human activities, construction also gradually becomes more complicated, especially the one of buildings of greater architectural significance. Today the implementation of a large project is inconceivable without the cooperation in a large interdisciplinary team, including civil engineers, mechanical engineers, electronics engineers, topographers etc. On the contrary the ever-growing number of specialists (lighting, energy management, acoustics, environmental issues, services, etc) required makes the team so big that communication and administration becomes increasingly difficult. Dealing with this fact leads to the necessity of a multi-member team of architects specialising on different fields.

Theoretically a student has already acquired training in teamwork, within the context of projects carried out in teams. However, working on a particular section within

a project, the responsibility to keep pace with the rest of the sectors (in respect with superimposed principles, standards etc.), keeping a common schedule and most of all working under the instructions of a coordinator are issues still lying far beyond student teamwork. Hence it is of major importance to comprehend the necessity as well as the real nature of teamwork. It is also essential to understand that a minor individual contribution within a large project does not in the least reduce the value of the contribution or the architect himself. Besides, with the exception of dwellings, it is rather impossible for an architect to carry out a larger project all by himself. Behind each and every renowned architect's name hides a large and always anonymous team of partners.

### **Dimensioning by approximation**

The ideal approach to implement a large-scale project would be an on-line cooperation in real time with all engineers and specialists involved. In this way, a civil engineer would recommend dimensions of columns and beams, to enable the architect to adjust the dimensions to his design simultaneously, so that these structural elements cannot constitute an aesthetic quality other than the one intended. The mechanical engineer would point out the placement and the dimensions of ducts and pipes, so that they can be integrated in the design instead of appearing as independent, 'unpredicted' elements. The same applies to the other 10 - 15 engineers and specialists. This way of working on-line is not yet practically feasible, although the required technologies are already available. Therefore cooperation takes place not in parallel but in a serial manner, with the drawings wandering back and forth via e-mail from one engineer to another. This kind of practice goes at the expense of the project, the initial architectural concept undergoing a series of modifications in order to adjust to a number of requirements, not architectural but realistic.

The only remedy available to the architect to deal with this problem (likely to completely ruin his work, as experience shows) is to realise right from the start that he is not alone and to have an idea about how other partners will manipulate his concept. It is hence fundamental to architectural practice to dimension in a realistic fashion, without calculating (calculations are better left to others). This means that the architect delivers data with values that are approximate but on the safe side, so that the rest of the engineers involved can rest upon these data and further elaborate them. This dimensioning by approximation has always been

a quality of a good engineer and constitutes part of the architects job without rendering the rest of the engineers useless. On the contrary they secure the architect's work, i.e. its implementation.

The most important ability an architect can develop in his work is to ensure that the proportions of an object are the right ones (apart from knowing its basic dimensions). A column in a single-family house can be neither 10 by 10 cm of size nor 100 x 100 cm. Still, in case a 'common' column of a building has a height of 8 m (and not the usual 3 m), it should be accordingly larger in its dimensions. The architect should be able to predict these proportions if he wants to see his projects built. An important role in developing this ability is the study of well-known works by well-known architects built recently or in the past.

### **History as a Course in Architectural Studies**

History of Architecture, the study of the Architecture of various historical eras as well as the history of the recent past certainly represents a topic of great interest. However many students do not consider History courses being of great importance, especially in comparison to Design Courses, where they are challenged to 'make' Architecture (and not to study its History). The crucial matter here is the connection of History Courses to Architecture itself.

Architectural History primarily examines buildings that survived in time, either as natural entities or as drawings or delivered descriptions, that is buildings that are (or were once) worth studying. Besides historical data on the main characteristics, the epoch's style, etc. there are other data, such as construction methods, materials, static, weatherproofing as well as plan organisation, proportions and other elements. Such data bear witness to the skills of particular architects and constitute a database from which one can harvest knowledge and experience, as long as one knows how to see and comprehend.

Needless to say, a direct transfer of technical solutions from historic buildings to modern ones is not an appropriate practice. Nevertheless one must take into account that old and established methods are dependable methods and every change (towards new and better solutions) has consequences of the kind one cannot see in the drawings but are likely to emerge in the building under the most unfavourable circumstances. The aforementioned do not suggest not trying new methods. On the contrary, it is a widespread tendency

among architects to test new solutions.

Yet one must not overlook possible negative effects of certain innovations, which, although feasible, can waste an Architect's positive efforts. Therefore, and because it is not easy to predict all consequences just by looking at drawings, one must learn to effectively use other people's experience. This experience is offered to everyone through the teaching of the History of Architecture, which after all indirectly but clearly states the relationship the building has with time.

### **The Importance of Time**

Nothing we can do at the stage of planning, designing or imaging can estimate beforehand the real impact of the building's interaction with space and most of all with time. The principal natural element connected with decay is water and therefore the way water affects a building is our main concern. It is often unnecessary for one to wait a long time in order to see the results of one's decisions. Most of the times the first rain will do.

It has been put directly during the meeting, that buildings are not photographic material for publishing after completion, as is common practice. Buildings are spaces for living meant to last for a long period of time. The wretched condition of many buildings after just a year's life reveals the schools' inaptitude to deal with the problem, particularly when it concerns new buildings with innovative design and building elements. On the other hand, older buildings everywhere stand as testimony to the skills of architects of the respective era. Buildings that prevailed in their battle against time are sources of experience. These buildings are the subjects of History courses in Architectural Schools. It is interesting to know how a Byzantine Temple built 800 years ago can still exist and withstand climatic strain, whereas water drips from the ceilings in the wing of the Architectural Department of Thessalonica right after every rain.

History should be approached as a paradigm for studying and gaining experience from for today's practice and not only as a magnificent historical item. Its connection with Architectural Design will benefit both History and Design, will aid the Technology Courses and will upgrade studies in general, removing at the same time doubts as to what is primary or secondary in an Architectural School's Curriculum.

### **Conclusions**

The debate and exchange of ideas and experience among architects in an international framework points towards common problems and is conducive to new ideas and solutions for the improvement of studies in Architectural Technology as well as Architecture in general. At the same time it offers valuable means to fight isolationism in Schools, mainly in issues regarding Curricula and affecting individual time schedules. Knowing very well about many of my colleagues' tremendous experience in Design and Construction, I believe that an equally useful exchange of ideas and many valuable conclusions could result from an internal scientific meeting.

Currently our Department is re-organising its Curriculum and revising its viewpoints with regard to teaching Architectural Technology. This process coincides with an international tendency towards re-defining all the above issues in order to successfully confront new requirements emerging internationally and more particularly in Europe.

Restructuring one single area in the Curriculum inevitably affects other areas as well. Upgrading a Curriculum can only be effective when it concerns studies as a whole and when studies are carried out free of preoccupations or fixations of any kind. Experience up to this day, regarding the reactions of the Department's various Bodies as well as those of Students' organisations to every endeavour to restructure and update studies, hasn't always been positive.

# Introduction to the Discussion of the "What and Why"

Dimitris KOTSAKIS  
Program Coordinator, School of Architecture,  
Aristotle University of Thessaloniki

The end is learning to design in order to make sense. The question is what is sense. If the answer to the question is that sense is not just an idea, but an emotionally complete idea brought about by a thing, then the end is learning to design in order to construct a thing that brings about an emotionally complete idea. The necessary condition to this end is learning to design in order to construct.

But designing in order to construct is not the bitter means to the sweet end of designing in order to make sense. The act of making a thing is an essential part of the act of making sense out of it. It is impossible to take apart the sense made out of making and the sense made out of using things -that is of things that Architecture is about. And the complete sense made of such things is the sense made beyond just imagining them.

Education, as an existing system, has borderlines built into it. There are lines between semesters and lines between courses. The teaching blocks are clearly cut and measured in units of attendance (credits) and attainment (grades). The problem is that design pedagogy demands limits but not borderlines. And there is a difference indeed: there is a limit of day into evening but not a border between day and night.

Making a program for Architectural Design involves the solution of a riddle: how not to compromise design pedagogy in the context of design education. There is no borderline between the thinking of design and the thinking of construction; but there are limits of the one into the other, which pedagogy must respect; and there are lines that the educational system uses to translate these limits, which pedagogy must not respect. In this school (AUTH Department of Architecture) we have decided to try the following pattern.

## The Context

(Learning to Design in order to make sense)

The context is what we might call Integral Architectural Education. In contrast to General Studies on Architecture, the Integral Education of Architects aims at the integration of skills in the following special lines of

practice (1) Design: design of objects, buildings, urban spaces and landscapes (2) Construction: construction of buildings and spaces (3) Regeneration: preservation, restoration and re-use (4) Spatial Planning: urban planning and spatial development

The studies follow an unbroken 5-year course structured in three cycles (I) A one-year Introductory Cycle covering the whole range of subjects. (II) A three-year Basic Cycle comprising (II.A) Four "Studio Programs", coordinating Design-Planning Studios with courses on technical and theoretical aspects related to the studios, grouped as follows: (1) Design and Construction, (2) Design and Conservation (preservation-restoration), (3) Urban Design and Landscape Architecture, (4) Urban Planning and Spatial Development (II.B) A "General Program" supporting and completing the studio programs with general courses in theory and history, art studios, and courses on mathematics and informatics (III) A one-year Diploma Cycle comprising (III.A) two studios: one on Architectural Design and one in Urban Planning, both including Urban and Landscape design from their complementary perspectives and (III.B) two diploma theses: one on theory and one on design or planning.

## The Teaching of Construction

(Learning to Design in order to Construct)

In the above context, the teaching of Construction is planned in the following way

- I. The core of teaching is the following system of studios
  - a. A one-semester introductory studio on the "unity of design and construction", operating in the second semester of the first year of studies (Introductory cycle)
  - b. Following the introductory studio, a one-year (two consecutive semesters) studio "on construction" involving:
    1. Structural Design (general principles) and Analysis of Construction
    2. Experience of the Building Site.

- c. Following the one-year studio on construction, another one-year studio "from design to construction and back to design".
- d. Two one-semester studios:
  - 1. Building Physics and Technologies
  - 2. Installations and Mechanical Equipment (Building Services)
- II. Coordination of the above system of studios with the following four one semester engineering courses:
  - 1. Structural analysis
  - 2. Dynamics of structures
  - 3. Reinforced concrete
  - 4. Steel and timber structures
- III. Leave the rest to the 11 design studios, extending over the whole range of educational cycles (Introductory, Basic, Diploma) and of practices (Object and Building Design, Urban and Landscape Design, Preservation and Restoration), with no constrain other than the pedagogical division of studios into two types:
  - a. Direct Supervision
  - b. Indirect Supervision

## Discussion

Everybody agrees in that there is no Architecture without Construction and that there is no Design without Meaning. But we know that there is no Construction without calculation and that there is no Meaning without feeling. Hence in a culture in which feeling opposes calculation, Architectural Design is a contradiction.

«Of calculation, teach only the principles» is not a solution: a principle is just the thing you learn nothing about, if you are left with it alone. «Drop calculation, materials and structures is what counts» is even less of a solution: the mathematical form and the physical content of construction are inseparable. Consequence: you cannot dispense with engineering.

The good old Cartesian tradition has a solution. There are two kinds of studies according to the French Ministry:

- a. Studies of Architecture (dealing with Architectural Mind)

Of this first kind, the studies are

- studies in Creation: the work of the Master.

- b. Studies for Architecture (dealing with Architectural Body)

Of the second kind, the studies are

- studies in Invention: the work for the Master

Invention follows orders: the orders of God, in the form of the "Laws of Nature", and the orders of the Master, in the form of "Design". Invention is the virtue of construction, the spirit of engineering.

The complement of the Cartesian solution, in an equally good old tradition, is that there are also:

- c. Studies on Architecture, dealing with Studies of-and-for Architecture.

Of this last kind, the studies are

- studies in Theory: the work of the Wise.

Theory makes conscious the meaning of the «Master's orders» and advises upon what is right or wrong in giving them, what is success or failure in following them, what is beautiful or ugly in the things made after them and, of course, what is the meaning of all these: the right, the successful and the beautiful.

Is it not possible to have another kind of studies?

These would be:

- Architectural studies: the work of the Architect.

Of Architectural Studies, we expect the integrity of being «of», «for» and «on» Architecture; that is, we expect of them to be creative, inventive and conscious.

Who needs this kind of studies? The responsive student needs them, facing a market in which the demand for increasingly diversified capacities outdates their profiles in a «software» tempo. And the responsible society, in so far as the accountability for its lived space is related to a comprehensive knowledge of its production.