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**Dynamic & Interaction Teaching**

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The call will present the experience of a different form of teaching construction. The basis consists to confront one project to begin a constant interaction between students, professors of the architectural school and lectures from the industry of building, using a dialogue through the computer and all its applications: internet, intranet, e-mail, auto cad, power point..., the oral expression, the events of the city or territory, being as much as possible in the sustain line. The come and go back between students, professors, computers & technician, open the curiosity of how we can build the architectural idea in eco & present method. The students begin to be interested in construction science.

Alrun Jimeno & Xavier Pouplana are two teachers at ETSAB-UPC (Polytechnical University of Catalonia – Technical Superior School of Architecture in Barcelona). The first is teaching in the specification construction, (Construcciones Arquitectonicas 1) CA1-704 and the second in architectural projects, (Proyectos Arquitect\_nicos ) PA-735.

Both teach in equal proportion and impart the course "Design of Architectural Elements"= DEA. The teaching period goes along four month every year, in the 2on fourth trimester (Q-P) and it has the value of 4,5 credits.

With this little introduction we want to expose the origin & the evolution along the 10 years of history.

#### *HISTORY OF etsaB-upc*

- From the generalist architect to the specialist architect.
- New plan studies 94.
- Credits reduction.
- New structure of studies: O, OP & ALE
- But maintenance & growing up the education level.
- Great efficacy in knowledge transmission.
- Olympic Games 92 & Cultures Forum 04 Approach to Superior Education to Europe Space EEES
- Open to mobility programmes (SOCRATES, TEMPO, SICUE, SENECA, AMERICA LATINA & VISITING STUDENTS)

The new STUDIES PLAN 94 (08.09.94) written on the B.O.E 238 the 05.01.1994, propose a different system of studies. The superior teaching must approach the city & the territory.

The eventual happenings like the Olympic Games 1992 or the Cultures Forum 2004 help to find a rapprochement between Barcelona and Europe. Our school etsaB-upc will participate in the Superior Education to Europe Space EEES, with the plan reformed.

Let's see what it means

- Reduction of credits in all the disciplines
- More efficacy in the transmission of knowledge

The reduction of credits doesn't allow the teaching of all the historic knowledge to all the students.

### STRUCTURE OF STUDIES

- OBLIGATORY (O): UPC EEES SUPERIOR EDUCATION IN EUROPE SPACE
- OPTIONAL (OP): ETSAB, different specialties.
- FREE ELECTION (ALE): Teacher, complementary education.
- OP: DEA design of architectural elements
- Requirements: 1st cycle complete etsaB + mobility programme students
- Look for: effectiveness & good results, but with less resources & short work.

So, the studies plan will structure the disciplines in three categories:

- Obligatory "O" the basic disciplines for all the students
- Optional "OP" specifics
- Free election "ALE" complementary education

That means that the new PLAN allows the student to choose in different OP or ALE. The studies of the OP + ALE depend directly from the etsaB. The system may change some disciplines, easy, to get students specialists in a different field.

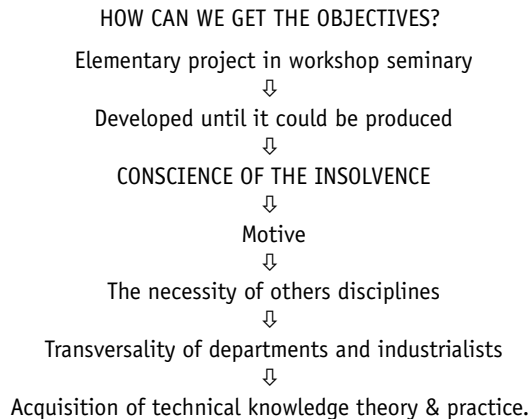
What will the plan obtain?

- A new model of specialist architect is appearing next to the ancient model of generalist architect.
- The OP is helping to favour the transversality through the different departments (because the theme would be proposed by the etsaB & it is easy to make one change or innovate by the O & ALE.)
- The need of scientific knowledge, open the curiosity of the student in technique problems: graphic expression, construction systems, static & dynamic, comfort, sustainability...
- Those concepts (need & transversality) allow the introduction to the discipline, project in the first course, because of the *conscience of the lack*.
- Exciting the student to learn construction & other disciplines.  
This anxiety stimulates him to learn the technical disciplines that will give him security in front of the competitor and the society.
- Looking for the creativity generates the motivation  
The PLAN of Vallés prefers the transversality before motivation, ETSAB is the contrary.

Any way the three points are: efficacy, transversality & motivation looking:

- to be more efficient in the professional area with less study hours
- at the project as the axe who will open the motivation makes the possibility to reduction O and be complete with the OP
- to have sustainability considerations like an important factor of the global vision of the necessities of a society in transformation.
- To approach the architecture building to the industrialisation of elements or systems. This evolution goes very fast & need to act constancy
- To open students exchanges to the main goal Socrates/Erasmus programme that encourage European cooperation in the field of education

- IN THIS CONTEXT WAS BORN DEA LIKE AN OP.



In 1995, Alrun and Xavier, did promote the interdisciplinary course, called "Design of Architectonic Elements", DEA. DEA pretend to offer to some students an integral formation, theory and practice in project field until this obtain the construction definition for to be produced.

The teaching method needs the assessment of more people, some coming of others departments from de upc, (structure, condition, construction) others coming from the industry, that means, techniques with special formation always with the actuality known.

The course is organized like a seminar workshop with our presence & other teachers. The student has access to technical information with the team of lecturers, journals, books and programs computer. We offer the way to get engines to develop interger the project with fewer recourse and minimum effort.

Alrun and Xavier, do propose one little project, every year different that can be done in four months. The subject proposes some necessity of knowledge that the student opens the interest of the different disciplines of the studies. It begins the transversality through the department (graphic expression is an instrument to expose the idea, structure for holding the elements that need the construction to be able to the union of all, the condition to get a comfort, mechanic to assemble and to clear away many times...)

The education is done by

- theory
- practice

Knowledge

- The theory normally is making over monographic themes: steel, aluminium, composites, glass & manufacture, silicon, polycarbonate, textile, lift, stair, photovoltaic, zinc...,
- The class can be theory-practicum that means that after the speech the students can handle the material zinc, silicon with engines brought by the industry.

- Architects will expose the investigation of real examples: The translucent house done by Alfons Soldevila, The "world flower", the Venezuela pavilion in Hannover EXPO 2000. The lives can be open and close. Their principal material is textile & steel. Or a new geometry of photovoltaic cell that allows obtain curvilinear forms, investigated by Rogelio Leal a doctoral architect.
- To assist at actually events like Construmat, (in our city it happens every 2 years), Forum ( we get one at the 2004) helps also to grow the construction knowledge.
- Commentary & consulting the bibliotheca, journal, and web make an amplification of the teaching.  
Any way DEA is a life discipline.

### **How goes one course?**

- Every year the theme is different
- The first day there is an exposition of theory and practical activity
- One little project is proposed
- Presentation and criticism of examples that we choose
- Show & discussion of models brought by the students
- The students write or design their idea
- It could be a new model or make much better an existing one
- It fixes a constructive system
- During the evolution theory and practice goes together, lessons & corrections private & public
- The project grows until it could be produced
- The instrument is the computer with the programs that will be necessary and the model.

### **What themes have we proposed?**

- Deck plan transparent with domestic large
- Tram station
- Fire stair
- Bridge between two hypothetic building
- Hall-porch the upc-chapel "Torre Girona"
- Exterior box lift going up to the top of a gothic church
- Rural bus station
- Window for the etsaB
- Beach kiosk
- Industrial public interior stair

## The program of a year

DEA - DISEÑO DE ELEMENTOS ARQUITECTÓNICOS			
FECHA	ACTIVIDADES		
Febrero	8 martes	XP-A	Presentación de la asignatura. Tema "escalera interior pública que sea industrializable". Análisis de la Normativa. Presentación de ejemplos de ilustres". Ejercicio en clase: definición de necesidades. Croquis rápido de la idea emplazamiento, tipo, elemento, y materiales."adjetivos"
	15 martes	XP-A	Análisis y crítica de ejemplos aportados por los alumnos. Selección de adjetivos semejantes. Agrupación de alumnos por afinidades Idea de sistema de trabajo de una escalera."Jordi Maristany"
	22 martes	A	Materiales adecuadas para: estructura, peldaño, pasamanos, antepecho Formas de apoyo o fijación: cimiento, viga, pilar, pared. Comentario de los croquis rápidos. Visita de casos reales. Biblioteca Campus Nord- Gabriel Ferrater.
Marzo	1 martes	A	Criterio de diseño de los elementos portantes. La madera: natural o laminada. Las barandas opacas y/o translúcidas. Ensamblajes. El vidrio. Aplicación al peldaño y/o a la baranda. Ejemplos.
	8 martes	A	El acero: galvanizado, pintado o inoxidable. Los cerramientos metálicos opacos o translúcidos. Sistemas de unión: tornillos, remaches, soldadura. Otros metales: cobre, aluminio, zinc-titanio...
	15 jueves	XP+A	1ª entrega. Presentación del anteproyecto. Planta escalera, sección, alzados anterior y posterior de: escalera, peldaño y barandilla. Derivados del petróleo. Policarbonato, poliéster. PVC Composites: alucobond. trespas. Resinas fenólicas: prodema. Naturvex cemento y fibra Corian
	29 martes	A	Taller: corrección de la 1ª entrega. Los elementos pétreos. Hormigón natural o artificial (Breinco, Escofet) El granito, los mármoles, el silestone
	Abril	5 martes	XP+A
		A+XP	Taller de diseño
	12 martes	A+XP	2ª entrega. Proyecto: plantas, alzados y secciones. Escala. 1:10 Tornillos, peldaños: huella y tabica a escala 1:2. especificaciones técnicas Crítica de los proyectos realizados por los alumnos.
	19 martes	A+XP	Normas y modelos de representación gráfica. DIN, UNE, ISO... Taller de diseño.
	26 martes	A+XP	Taller de diseño. Idea de ensamblaje y empaquetado de la escalera. Taller de diseño, apoyado por un professor de "graduado superior"
Mayo	3 martes	A+XP	3ª entrega corrección de la 2ª con despiece de elementos, Perspective axonométrica, 3D, o maqueta,. Discusión sobre los resultados de las propuestas
	10 martes	A+XP	Las instalaciones. Posibilidad de iluminación nocturna. Dispositivos de emergencia. Taller
	17 martes	A+XP	4ª entrega y última. Discusión abierta de los trabajos entregados.

Profesores: Arlun Jimeno Urban, Xavier Pouplana

Febrero 2005

## Bibliografia

Alberto Fernández Soria. "expresión gráfica" Mira editores. Zaragoza 2003

Catherine Slessor. Contemporary Staircases. Mitchel Beazley. London 2000

Josep M<sup>a</sup> Serra "manual d'elements urbans" mobiliari i micro arquitectura. Espai públic urbà Diputació de Barcelona 2000

## How does the student evolve?

There are different ways of working: the student can begin about one model done & make it better or he can begin from zero and create a new form. That means that the industry can find new products if the student is sufficiently creative & receptive. We insist it must be eco.

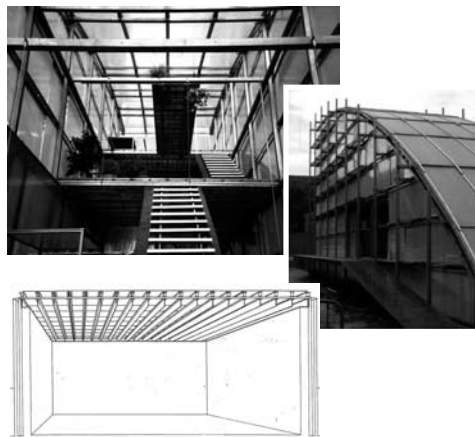
- The receptive and the creative, help to him to arrive at developing to an executive level.

The results come out with the support of many disciplines:

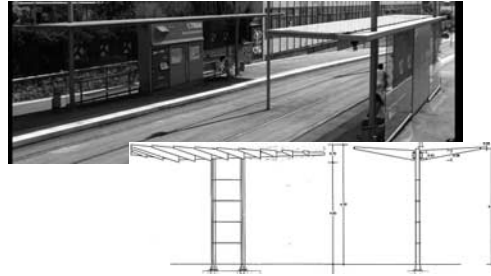
- Academic teaching at the classroom
- Visit to examples builder or analyse hypothetic cases resolved similarly
- Analysis of materials or systems that could be use for the project
- Making a pre-dimension with verification of the section
- Making a model
- Management of the elements & system characteristically
- Opinion on the fabricant, professional, internet, intranet, journal & catalogue
- An interaction inside, outside take out a very dynamic teaching.
- The presentation of the project will be complete with the assembly of the pieces, rendering & model
- Public discussions take place during the evolution of the project
- At the end there is the qualification and the recompilation of the works to show at the new year to the new people of the course.

## The sequence of the theme has very often contact with the reality

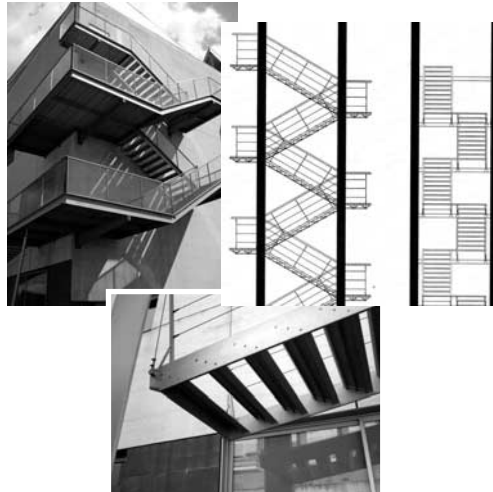
1. *Plan deck transparent with domestic large.* There is a moment that the society & architect will use the glass for beam and column. Structural glass is very useful in our building. The professional Jose Pablo Calvo of CITAV, (technology centre of glass technical applications) visit us to explain how to use and make the calculus of this material. He sends us the catalogue with plenty of information one year after another.



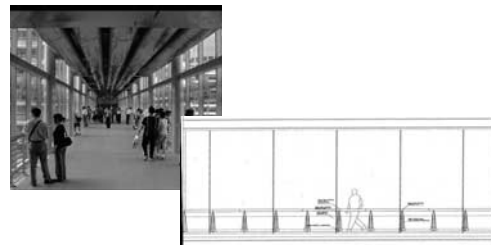
2. *Tram station.* The project was develop before the existing the "tram-baix". The designer of the Metropolitan area transports came and exposed to us, all the possibility of station cases. We get the basis about the itinerary of the rail tram and models of different tramways.



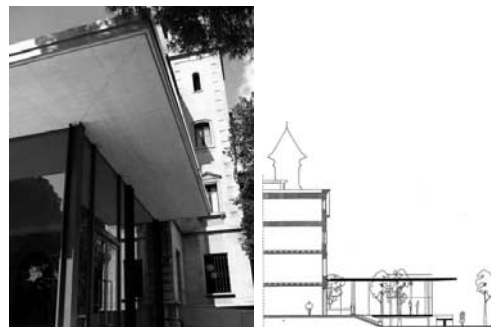
3. *Fire stair* is a candent theme after there was an edition the CPI-96 norm's in Barcelona, about the fire. Francisco Labastida invited teachers of condition and bumper to interpretate the text. With the introduction we visit the stairs add to the buildings of our university and after the students make the definition of their work. It must be a series industry element. After 1996 many hospitals, schools and public building have adapted the construction to their fire norms.



4. *Bridge between two hypothetic buildings.* After the Olympic Games many bridges were built so we intent to suggest the analysis of the problems that have ancient and new materials when put together, different levels to connect, covered or uncovered.

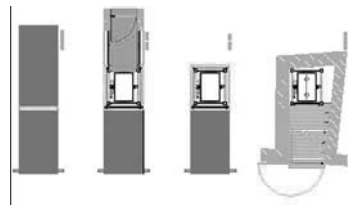


5. *Hall-porch the UPC-chapel "Torre Girona".* It was a chapel at a girl's school and now it will be one multifunction space that needs a hall for teachers & people of the upc. It is a real necessity to approach to the ETSAB. The UPC will give an actual image of the corporation. We could hear the necessity explained through the Dean and many solutions

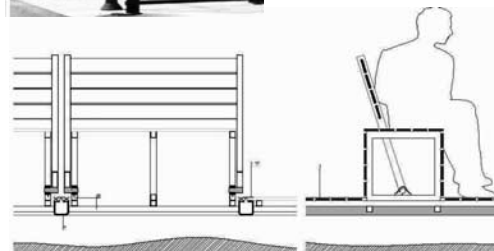
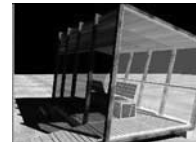


came up. The problem of the accessibility was a new parameter resolved. The architectonic barriers need to disappear.

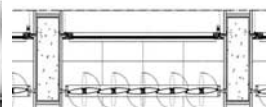
5. *Exterior box lift* going up to the top of a gothic church. The remediation of Sant Marti's Church needs to use the space under the deck. The stairs to climb up are very uncomfortable and one must be able to visit at the incapacity people. We give the plans of the place and the building to make the project. Professional of lift Kone and Ersce make us a presentation of the different product of the market. Other professionals make a speech of lightness façade for to close the lift.



7. *Rural bus station*. With the big movement from the city to the country, the state makes the strengthening of the public communication. The time of wait is longer than in the city & the construction presents several difficulties. May be there is a small road unable to be used by the truck. So different problems appear than the tram-station. It was a year that we had many Socrates students and the solution had great variety.

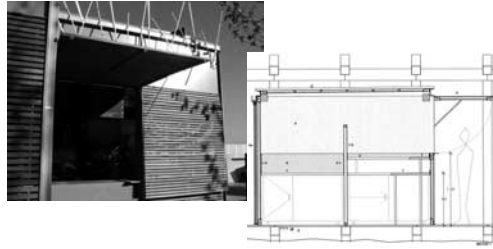


8. *Window* for the ETSAB was one not so interesting project for the students. Anyway it is a real problem for the teacher's offices of Segarra building.

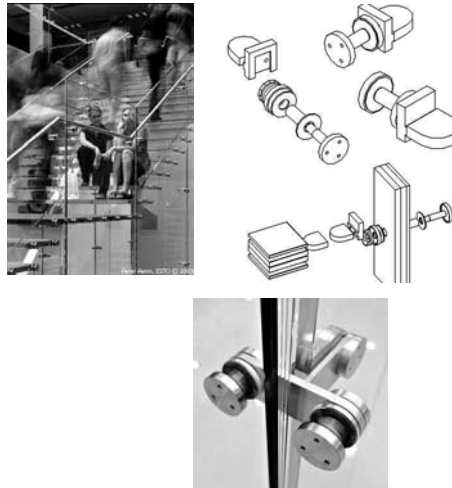


9. *Beach kiosk* coincides with the arrangement of one beach in "Bagur" village by the collaboration with another OP in combination with Teresa Rovira and

Bosch. We use the landscape of Costa Brava beach to begin to work. At the time, in Barcelona there were constructions for the forum cultures, so we visited the different constructions in situ guided by the director architect.



10. Industrial public interior stair. That is the last project done by our students. They could propose the emplacement. The places are changeable: a department store with a very extended stair, a big store with a transparent stair, little elements that you can make in a unit with different inclinations, or others that want to offer a good, beautiful & cheap solution.



Every year the theme is new, and enables us to deepen more and more, year to year. The renovation every year supposes an attraction for the student and also for the teachers. The teacher brings from the industry news to the classroom. There is a continuous knowledge at the lecture room. The student learns to find information in the front of every challenge. They learn to critic and choose the best solution that the industry offers. The teachers offer their opinion about the esthetical aspects and respect student opinions. The constructive critic is drive to the possible pathology. What will be with time and how the sustainable concepts so necessary in our world are resolved.

#### Note

The technical industries that visit us are: glass (CITAV, Pedragosa, Cricursa), aluminium (Tecnal), stainless (Acerinox), polycarbonate (General Electric, Poliglas), composites (Alussuise, Trespa), photovoltaic (doctor in the theme Rogelio Leal, Dr. Lloret), textile (Nelson Rodríguez, J. Ignasi Llorens), silicon (Collack) zinc (Guild Cooperative), lift (Kone, Ersce) ...