The idea of writing this book was born from a faculty exchange, in which I had the chance to participate, between the School of Architecture and Design "Eduardo Vittoria", University of Camerino, Italy, and the Architecture Department at Cal Poly, California, USA. This book intends to be a means by which the interesting exchange of teachers may not remain an end in itself, but will be a useful and fruitful exchange of knowledge, teaching methods and experiences that enrich the two schools of architecture, and beyond.
m.r.

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ISBN 978-0-9835817-3-4 90000
9 780983 581734

€ 35,00

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Author:
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Cover Design:
Monica Rossi
with
Stefano Ortolani

Book Design:
Monica Rossi
with
Lucrezia Gasparini
Maria Gentile

Published by:
*Ae*D Press
Architecture Department
College of Architecture and Environmental Design
California Polytechnic State University
San Luis Obispo, California 93407 United States
www.arch.calpoly.edu

Printed and bound in Italy

First Edition, 2012

ISBN 978-0-9835817-3-4

Architecture Department
One Grand Avenue
San Luis Obispo, CA 93407-0282
www.arch.calpoly.edu

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Index

Introduction _ Umberto Cao, Dean of the School of Architecture and Design "Eduardo Vittoria" at UNICAM 5

1. UNICAM vs. Cal Poly 7
- *An exchange experience between UNICAM Italy and Cal Poly USA*
- *A conversation with Monica Rossi, UNICAM _ questions by Kent Macdonald, Cal Poly*
- *A conversation with Sandra J. Stannard, Cal Poly _ questions by Maria Federica Ottone, UNICAM*

2. Learning by doing 35
- *Doing as pedagogic instrument*
- *Designing and building "habitable structures" for Design Village*
- *Designing and building a booth with students*

3. Learning by designing schools 57
- *Designing energy efficient schools in different climates*
- *School projects in 4 Italian climates*
- *School projects in 4 U.S. climates*

Appendices: Learning architecture in Italy and USA 91
- *Teaching 2nd year Design Studio in Italy _ Massimo Perriccioli, UNICAM*
- *Teaching 2nd year Design Studio in USA _ Howard Weisenthal, Cal Poly*
- *Teaching Environmental Control Systems in Italy _ Roberta Cocci Grifoni, UNICAM*
- *Teaching Environmental Control Systems in USA _ Troy N. Peters, Cal Poly*

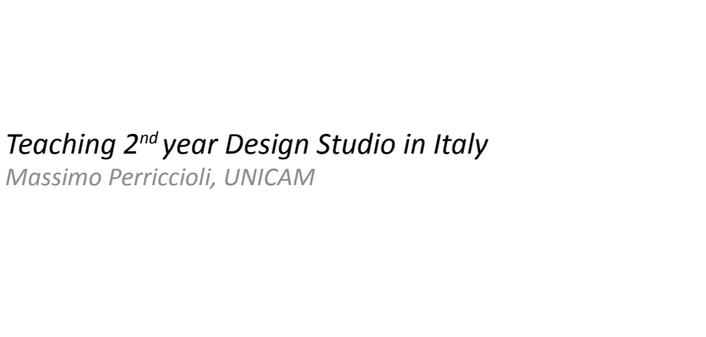
Postscript _ Maria Federica Ottone, UNICAM 120

Teaching 2nd year Design Studio in Italy

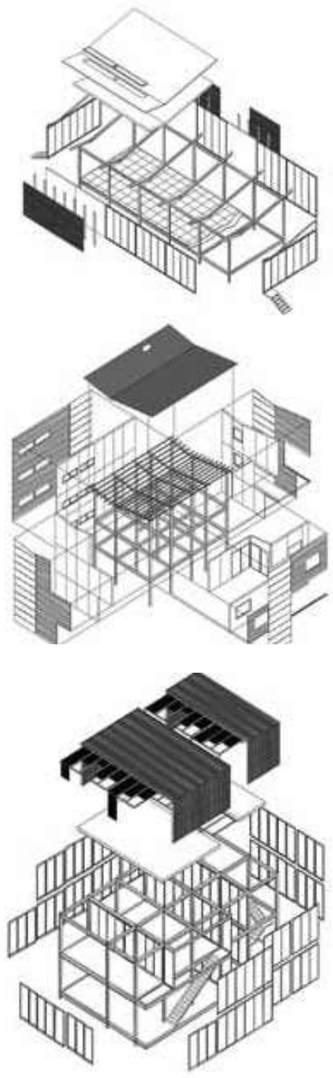
Massimo Perriccioli, UNICAM

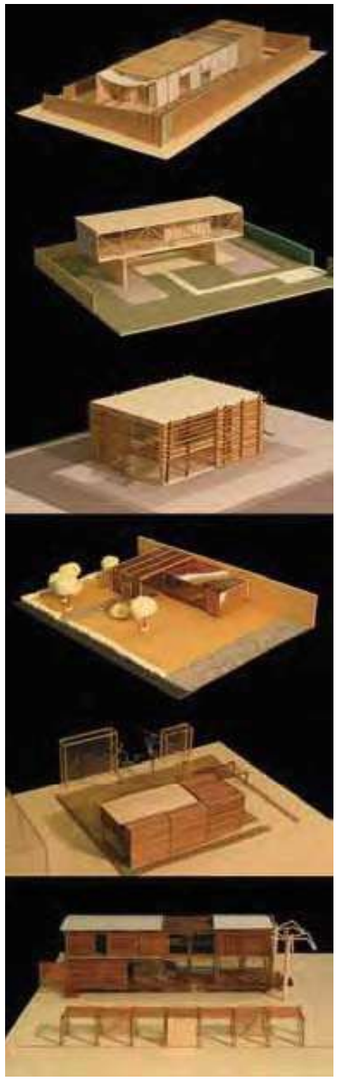
This page: *2nd year Design Studio, final review.*
Opposite page: *2nd year Design Studio, Students's work - exploded axonometries.*

Building as the "Art of Connection"
The educational structure of the Workshop in Architectural Construction I, characterised by the centrality of lessons in The Design of Building Systems and the parallel teachings of Building Techniques and Technical Physics and Plant Systems, intends to provide students with the theoretical, methodological and operative tools required to explore architectural space in its technological, constructive and environmental dimensions. Students will be instructed from the outset to understand the problems of design as belonging to a relationship between architecture and building, technological solutions and aesthetic results, structural conditions and environmental systems, transforming the examination of building materials and techniques into an essential component of the design process whose final objective is the realisation of a work of architecture.
The teaching of the fundamental principles and logics of modern construction is not based on the content of manuals or "suitable solutions", but on criteria of pluralism in construction aimed at explicating different ways of conceiving technical problems, studying and transforming them into innovative building systems and spatial solutions, coherent with functional data and conscious of their environmental implications. Using emblematic case studies, students will be guided towards "poetic" forms of building, intended as the "art of connection", considering technique as an essential element of architectural figuration and the tectonics of space; in addition, using design experiments students will begin to acquire the capacity, even within the complexity that characterises contemporary design, to govern the system of relations that indissolubly links materials, techniques and procedures of building with functional, figurative and spatial results.
The primary objective of the Building Systems Design course is thus focused on contributing to the development of an awareness that the relationship between from, function, technique and materials must be approached as a single "act of design" and, from the outset, confronted through the control of spatial, functional and structural qualities, as well as through the technical control of the performance requirements that each element of a building and each material must contribute to the work of architecture to be realised.
The course also proposes to assist students in maturing an understanding of the necessity of governing and controlling the complexity of relations and the multiplicity of techniques, know-how and skills that converge within the process of designing, manufacturing and building a work of contemporary architecture. This is achieved using a scientific and methodological approach to design that attempts to overcome the traditional dichotomies (form/technique, architecture/building, concept/realisation) generated by the teaching of architecture as a collection of autonomous and separate disciplines.



Lightweight Building Systems
The design methodology adopted in Workshops in Architectural Construction is based on a systemic and performance-based approach that constitutes the primary point of reference for design related to Architectural Technologies. This methodological hypothesis establishes the needs and requirements of the user as priority objectives and consents an interpretation of each building as a system of elements, spatial and technical, organised to satisfy the needs of dwelling and characterised by the functions of its various parts and their levels of performance.
In light of the industrialisation of the building sector that developed in Europe after the 1960s, the general conception of constructing a building offers a confrontation between two opposing visions: one based on the use of heavy building systems, the other using lightweight systems. The first case privileges the "strength of weight" in determining the geometric layout and static structure of the whole; heavy systems are characterised by the mass, compactness and absolute impossibility to separate components and functions and a need for continuity (for example, buildings realised according to this approach often coincide with the load bearing structure or the envelope). On the contrary, lightweight systems refute the strength of weight as the primary regulator of static equilibriums, strategically focusing on involving internal structural tensions through opportune morphological choices, in order to optimise the use of materials and reduce the system of applied loads.
The design of lightweight building systems thus makes exclusive use of the form of the elements themselves to define the structure. A suitable design strategy, focused on reducing the weight of the structure can thus





be said to consist, on the one hand, of the differentiation and separation of the parts subject to forces of tension from those under compression and, on the other, focusing particular attention on the choice of materials with particular characteristics of resistance, selecting and controlling the system of applied loads to which the building elements will be subject in order to reduce their thickness. As such, the behaviour of a lightweight structure does not depend exclusively on the physical nature of its components and their particular performance characteristics, but primarily on the way that the parts are arranged in relation to one another and the spatial relations between the components, defined precisely by geometric parameters. Lightweight systems, what is more, allow for a clear separation between the functional roles of load bearing elements (the structures, realised primarily using mono-dimensional elements such as columns and beams to create two-dimensional and spatial frames) and the supported elements of a building (envelope, roof, etc., realised using layered two-dimensional elements). Lightweight systems are constituted primarily of structures whose relatively contained mass makes them capable of resisting even significant loads. In virtue of the modularity of their components and the reversibility of "dry" connections, they are capable of guaranteeing forms of spatial adaptation that allow for functional transformations required by their users.

Design Exercise: Aspects of Method

The exercise, developed as part of the Workshops in Architectural Construction, consists of the design of a low-cost, low-energy consuming single-family dwelling, constructed using lightweight technologies. Projects must focus on the search for innovative solutions, in terms of location and dwelling, and function and construction. The design exercise focuses on experimenting with:

a) flexible dwelling systems that, while safeguarding qualities of privacy, propose new forms of spatial organisation in relation to the requests made by a progressively less conventional and more fragmented user (young couples, foreign labourers, the elderly, out of town students, home-workers, single parent families); systems characterised by the transformability and adaptability of space according to the needs of new users or temporary uses by existing residents, by the mobility and manoeuvrability of furnishings and complementary elements, by the evolutionary nature of space in light of modifications to dwelling requirements, compatible with the dimensional and structural limits established by the general programme of intervention;

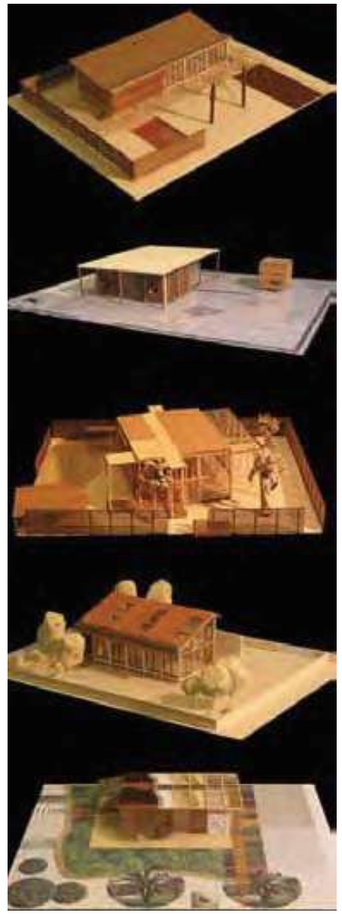
b) prefabricated building systems, based on the use of lightweight components and technologies and "off the shelf" materials and products, preferably eco-compatible, assembled using "dry" connection techniques; simple modular structures comprised of small sized elements; technical-functional devices focused on the optimisation and rationalisation of spatial-functional performance;

c) passive, active and hybrid energy systems, focused on containing energy consumption and maximising thermal benefits thanks to: the absorption of energy by the envelope, which also functions as an accumulator; the use of natural ventilation and suitable forms of solar screening; the accumulation and use of renewable energy resources; the capacity to modify the physical-technical performance characteristics of the building envelope over time, in relation to climatic conditions and user requirements.

In methodological terms, students will proceed with the study of the single-family residence, defining its environmental, architectural aspects and technological and building systems by identifying:

1. the needs of the client;
2. the framework of cultural, environmental, technical and productive conditions within which the project is inserted;
3. the relationships between interior/exterior space and between public/private spaces;
4. design reference paradigms: the flexibility of interior space; the reversibility of building actions, the dry assembly of components, adaptability to new spatial and functional requirements, the ability to enlarge the original spaces;
5. the relations between the parts of the building system;
6. based on the choice of materials

This page (bottom left): *Students receive an award for their project, Urban Promo Competition, Venezia, 2010.*
This and opposite pages: *2nd year Design Studio, project models.*



and industrial products selected from a catalogue, and related techniques of construction.
The project will be defined through continuous feed-back between the small and large scale and vice versa, subverting a diachronic approach to the progressive learning of technical aspects and details, beginning with the "architectural" definition of the functional and formal aspects of the dwelling. Expressive, technical and functional aspects will be examined simultaneously based on a method of design that focuses on verifying both the "buildability" of the aesthetic decisions made, and the "aesthetic qualities" of technical choices.
The representation of the exercise is thus focused on the comprehension and presentation of a design method that, excluding a "scalar" logic, is aimed rather at the holistic control of the environmental, systemic, architectural, technological and building aspects that participate in the definition of the dwelling.
This type of exercise focuses particular importance on:
1) the elaboration of an exploded axonometric drawing of the architectural organism, which permits the clear identification of the building system, "exploded" into its component parts (structure, external envelope, roof, internal partitions) and the clear documentation of this system in relation to the parts of which it is composed;
2) the study of the "sky to ground" section, aimed at defining the "value of the position" of each technical element with respect to the organisation of the whole, identifying the critical nodes of a system of connections between the structure and the external envelope (at the floor, roof and base levels of the building), further investigated and defined in building details at a "close-up" scale;
3) the definition of the climatic section of the dwelling, including the identification of the devices that allow for "passive" functions under diverse environmental conditions (summer/winter, night/day).

The primary objective of the Workshop in Architectural Construction remains that of providing students with a working method and approach to design that is simultaneously open and rigorous, laying the foundations for an understanding that it is possible, through the art of building and the science of architecture, to search for new forms of construction, sensitive on the one hand to the most recent technological innovations and, on the other, to the social, environmental and cultural conditions of specific sites and communities.

Massimo Perricioli is an architect and a Professor of Architecture at the School of Architecture and Design "Eduardo Vittoria", UNICAM. He is also President of the Graduate Course in "Architectural Sciences". After graduating with a Degree in Architecture in 1983 from the "Federico II" University in Naples (110/110), he completed his Doctorate in Architectural Technology at "La Sapienza" University in Rome. He teaches Building Systems Design as part of the Architectural Building Workshop I and, since 2008, the Technological Design Culture course taught as part of the Architectural Design Workshop III. For the same graduate course, since 2004 he has been coordinating the educational activities of the final Orientation Workshop in "Building Architecture and Environment", teaching courses in Architectural Building Technology and Experimentation with Lightweight Building Systems. From 2000 to 2009 he has been a member of the Procam Department Council and since 2006 he is responsible for the "Industrial Design and Experimental Architecture" (DIAS), curriculum that is part of the PHD Programme in "Architecture and Design" research offered by the University of Camerino's School for Advanced Studies. He is also the coordinator of the Scientific Committee for the International Study Seminar "Incontri dell'Annunziata – Giornate di studio sull'Innovazione tecnologica". His research investigates the field of technological innovation, in particular experiments with design methodologies for low-cost and low-energy consuming residential construction that makes use of lightweight and prefabricated building systems.

Teaching 2nd year Design Studio in USA

Howard Weisenthal, Cal Poly

This page: *Professor Howard Weisenthal's sketches.*

Introduction
Second year architecture students are, in fact, adolescents in terms of age and academic position.
Supported by research from developmental psychologists, educational researchers and middle school faculty, methods are introduced for improving the general studio environment and for developing more valuable design projects.
The second year architecture student is not only in the formal age bracket of an adolescent (13-19) but more importantly, the location of second year in a five year curriculum places them in a situation in which they are both embarking upon a career path educationally and questioning their skills and their future role in the profession.
They are in a period of disorientation, discovery, transformation, crisis and conflict.
The second year student is no longer an early adolescent but an emerging adult.

Human development clinical research
The confusion students experience is typical of their developmental age. Erik Erikson suggests that the conflict occurring in adolescence is a "normative" conflict a based in an age appropriate identity crisis - the opposition between identity achievement and identity confusion. James Marcia further defines adolescence as a period of crisis and "a time of upheaval" in which old values or choices are being reexamined