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Survey and drawing representation of architecture and environment: different teaching approach for architects and engineers.

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Abstract

The project of knowledge is articulated through various techniques of digital representation through direct and indirect surveys, site and architecture direct observation, reading and manipulation of images, comparison between historical and actual maps, with the aim to critically consider the project as an action in progress in place and time through evaluations of possible future scenarios, especially through digital three-dimensional representations. This paper puts into evidence the need to approach in different forms of teaching different forms of teaching Survey and Representation of architecture and the Environment at the Polytechnic School of Genoa diversified for the courses of Architecture and Civil and Environmental Engineering. The interdisciplinary approach is essential and at the same time determining the educational aims : planning, intended as a deep change in relations between the visual and historical memory of the place and the image that the territory acquires by the "new", requires a capacity for critical reading of the natural and anthropic landscapes in order to provide knowledge, through a stratified description of places.

The courses develop a central theme articulated for topics studied from groups of students ,all centered on the matter of the architectonic,urban and territorial representation, comparing the different techniques of the traditional sketch and the contemporary figurative languages (*the project drawing and its performance is addressed through the analysis of a path that highlights the potential conformation and representation of new digital tools. Topics: • Representation and modeling of architecture in the era of digital media. • New means of communication and creativity in the representation of contemporary architecture. We analyze the theoretical principles of topological surfaces, of hypersurfaces, and architecture of transarchitettura liquid up to design experiments and experiences of these concepts)* according to different levels of knowledge

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1. Architecture Survey

The figure of the Professor of drawing Representation at the University of Architecture and Engineering involves a capacity of synthesis of intrinsic and extrinsic characteristics of the discipline of Draw and Survey targeted to different purposes of professional education and training. The Faculty of Architecture in Genoa, Italy , from 2013 sees its transformation into the Polytechnic School (Architecture-Engineering) with the intent train a professional who has an intellectual and cultural humanistic, and scientific-technical background , in order to be able to develop a plan at   the different scales (building, restoration of historic heritage, landscape, etc..) from an in-depth knowledge of complex, cultural, environmental, technical and procedural issues. In relation to the objectives set out in Directive 36/2005/CEE (ex Directives 85/384/EEC and 86/17/EEC 85/14/CEE) the students of the Polytechnic School – Architecture acquire competences about: Design activities related to architectural design refers to different scales from a single building, to the relationship between the spaces, the city, the region and the environment structure , as well as on the existing intervention project, historical and/or modern; the possession of the principal terms of the theoretical lines of the architectural debate in contemporary culture; an adequate mastery of the history of architecture as a fundamental element of the interpretation of the past and of the cultural and methodological basis from the point of view of the signs and meanings ; the preparation in the area of techniques of representation and communication as a tool for understanding and modeling in order to understand the project of the physical space. I personally teach at the laboratory of Drawing Representation and at the course of infographic representation in the first year, in order to immediately provide the student with the necessary tools for the proper conduct of expression of the disciplines of the project. For this professional figure the role of the discipline of survey is not only a mere geometric and metric data measuring , but it is a form of knowledge aimed to the architectural project , conservation and restoration approach . During the course of drawing representation special importance is given to the freehand Drawing from life as a first approach to the study of direct and indirect Architectural Survey Project.

The phase of survey campaign is necessary after   a series of lectures on ARCHITECTURAL Draw. The fundamental aspect of the architectural draw is the "reduction" to two-dimensional form of the three-dimensional space of architecture, through appropriate reduction scales The "Concept of architectural draw" already includes, from antiquity, drawing of all aspects of the process of understanding, planning and communicating architecture planning and of all those addressed to the representation of the existing (survey drawings) to the different purposes of conservation / restauration and study of architecture (treaties, manuals, collections of drawings).

When we talk about architectural draw, we are referring to the drawing as a tool for the architecture, to represent it, and to do it, describing it towards all other possible draws, which tend to other purposes. It is therefore not only the subject to characterize this type of architectural drawing representation , and differentiate it from the architecture design (subject to architectural) and from the scenographic one . It is quite the architectural intention, manifested before the choice of the subject of what we wanted to represent or highlight; then the method of representation, the technique of execution, sometimes by certain conventions, and above all ,at the end, to give to the survey and draw the architectural character.

The graphs of architectural draw can be classified into two main types: extrinsic and intrinsic classification.

The extrinsic classification consists of several categories:

1.Depending on the purpose: studies on sites and surveys, through proportioned measurement, or with accuracy, by instruments; sketches and drawings of the project, ranging from the study of the architectural sketches, graphs of plants, sections, elevations, axonometric, perspective, architectural,   structural ,technological and decorative details (the same survey procedure); perspective views; fantasies; architectural visions;

2. Depending on the method of representation: central projection or perspective drawings, isometric drawings, orthographic projection drawings (plants, facades, sections);

3. Depending on the scale of reduction of the drawing, in the three reading scales: design detail or particular (from scale 1:1 to true, to a scale of 1:25); overall design of individual buildings (scale 1:50, 1:100); design of urban areas and urban structures (scales 1:200, 1:500, 1:1000) and urban, and environmental cartography (scale 1:2000, 1:5000, 1:10,000).

4. Depending on the instrumentation: design with precision tools (squares, rulers, calipers ...); freehand drawings; CAD drawing (the computer aided design);

5. Depending on the technique: just outline drawings, in light and dark ,in colour.

The classification intrinsic divided into two categories the architectural drawings, depending on the intention of the

architect or engineer rather than an artist: Expressive drawings or Technical Drawings

With these premise the Survey Drawing is the set of operations to determine the shape and size of a building, through a series of drawings (plans, sections, elevations, details), which allow to bring as many features of a building, then a knowledge as widely as possible, including historical-critical documents Archives, and the state of preservation, the fundamental basis for decisions to be taken regarding the building itself. Therefore, a more real "operation knowledge," criticism, which is not a mere drawing representation.

The class` lectures and seminars, will all aim to the comprehension and mastery of the volumetric, spatial, and contextual meaning of the studied objects – both existing and in progress ones. Different kinds of processing are in use: -traditional freehand drawings (sketches, outlines, perspective drawings, axonometric) -bi-dimensional-graphic drawings prepared with traditional methods (orthogonal and axonometric projections) -computer-aid drawings (CAD systems) -tri-dimensional graphical processing (3D) -the rendering process, for both surveys and planning drawings . A complete contextualization of the studied object is addressed by analyzing not only the metric, geometric, and figurative aspects, but also its historic and critic ones, because students will always have to evaluate his/her proposals within the context of the already existing environment, thus compare his/her graphic works with it. On this basis, the teaching for the architect sees the representation of Surveying Architectural direct and indirect (laser-scanner photogrammetry - photorectifier) aimed to the survey of detail, starting with the free-hand drawing and continuing with the more sophisticated digital representations.

The approach to the actual topic of the relation between the idea and the graphic representation of an idea to the planning level has radically changed compared to the past, really it just apparently denies the memory of the primary slight knowledge of the design meant like draw of the real; it is going away from the consolidated graphical languages that it is believed to have removed the traditional languages, but is just the relation with the history of the graphical –planning representation that allow us to perceive this great change in the perception of the spaces, quite denying the real spaces and trespassing in the cyberspace, enjoying our age, of the ability to create a space "beyond". Fundamental for the understanding of new "means" it turns out to be the analysis of an iter that leaves from the theoretical principles of architecture of the superficial topologic, of the hypersurfaces , the transarchitecture and the liquid architecture until the experiences and to the project experimentations of such concepts. The direct survey , the drawing from life , the investigation by the panoramic to detail are the early steps of analysis aimed to the study of the Survey and after of the Colour Project of painted facades .The compositive architectural facade was created as an expression of the lexical composition of the aggregation highlighting the architectural building elements and their interconnections.

From drawing to wire, the yield of shapes , surfaces, contours and tones and textures through graphics, up to a constant enrichment of their baggage of signs and techniques , everything becomes essential to understand an architectural detail , the relationship between architecture and urban configuration or landscape . Drawing from life , visualization criticism , communication, but this obvious assertion is precisely the most difficult to achieve, because, after a long time, you buy the powers of observation and execution and the readiness of reading actually that allow you to translate the observed reality in an image rich in meaning and can convey to those who view the drawing, the relationship established between reality and draftsman. Just as a subjective model of reality always different and changing , drawing from life is the result of a complex set of shape analysis , for immediate application of geometric concepts , evaluation tonal character selection , knowledge of graphic techniques and , of course, of critical consciousness . In practice drawing from life allows us to observe how things change depending on the brightness , the distance from the point of view and proximity to other elements ; allows us to understand that the signs are never an end in themselves , and that doing the technique must not prevail on observation and transcription of meanings. The images acquired during the photographic survey are altered by computer graphics systems with photo- rectifier first and then with shields contrast, the study of tone, of colorimetric curves in order to identify the different color tones.

2. Engineering Survey

My cultural background is strongly linked to the world of architecture and When I was asked to teach a course on Infographics Representation of the Environment as part of the Master of Science Degree in Civil and Environmental Engineering, the first question that I asked myself was that relating to the aims and objectives proposed by the degree course. The objective of CL3 is to prepare students to construction and maintenance of civil works design, infrastructure and equipment; design, planning and management of works and control systems, and monitoring the environment and territory; the assessment of the environmental impacts of plans and works, and then to assess their

compatibility with the surrounding environment; management and control of the services of companies operating in the fields of civil and environmental engineering.

In particular, the CL3 in Civil and Environmental Engineering has the goal of providing adequate knowledge of methodological and operational aspects of the engineering sciences, both in general and specifically in relation to those of civil engineering, environmental and land; ability to identify, formulate and solve civil engineering problems and environmental (structural and geotechnical problems of civil construction, industrial and infrastructure by addressing the issues of their impact on the environment, problems related to the planning and design of works to defend the territory; problems related to the design, construction and operation of control systems and environmental monitoring) using up to date methods, techniques and tools; knowledge and understanding of their professional and ethical responsibilities.

On the basis of these proposals, I organized the training course in theoretical and practical lessons that could combine the perspectives of the general to the specific course of representation. Representing the Environment and Territory starts from a vast knowledge base, the student confronts issues dealing with a complex system of factors that interact with each other, several factors that contribute to the final formation of the object of study: Planning and Environment.

Starting from the general, then the representation methods of cartography, from its origins to today, from the definitions of territory, environment, landscape, tracing and analyzing critically the main issues of national and international debate, we were able to deal with issues relating to the representation. Drawing means communicating throughdrawing, signs, symbols, images, and the rational composition of the final drawing graphics; the deconstruction of information and detail is the foundation of critical knowledge of a portion of territory , the same that will make the student able to unite and coordinate all information collected according to a logic immediate communication.

The aim of the course is was to provide a specific preparation, which prepare the student to correctly describe with photographic images and their digital computer processing the architecture , urban and regional environments.

The course acts as a tool for investigation of issues related to reading, understanding and representation of urban space and territory in order to design, conservation, restoration and recovery. The introduction to the technical tools at our disposal (CAD-GIS-Surveying complex hypertext systems) is directed towards a stratified description of the places that takes care of all the complicating and uncertainty factors that can find a dense form of expression and communication. The operation of detection and the choice of levels of analysis and survey , of the scale representation , the forms of the landscape drawing is, in itself, the first step of a critical operation that led to a multiplication of points of view for the realization of communication drawings related to the peculiarities of the places. Complex and articulated systems able to incorporate, justifiably, types, shapes and multiple codes adapting to the evolution of territory and aiming to identify generative rules and processing which contributes to carry out a task as descriptive fundamental premise of structured project assessment and territory planning.   The course develops a central articulated theme performed individually for sub-groups that are formed within the course, all centered on the question of representation of urban and regional planning in modern and contemporary art, with a focus on contemporary figurative languages that are   structured according to different levels of knowledge: historical   notes on the fundamentals of technical and expressive technical Drawing; Introduction to photogrammetry and photographic techniques to taken on the basis of the approach routes of the sites under study (general principles, photogrammetric survey, the photogrammetric, photointerpretation, orthophotomaps, satellite photos); Inspections related to the topic of investigation of the course through routes by land and sea;

• Practical exercises with individual computer workstations for the deepening of the trials of different imaging techniques (Autocad 2011 - Adobe Photoshop Sketch-Up - Perspective Rectifier);

•Photographic Processing (graphic simulation with digital instrumentation).

As the basis there are the theoretical and application knowledge of the drawing representation of space as the context of the environment and the ability to use the design as a tool of investigation and interpretation of the laws governing the formal structure of the elements of the territorial and environmental factors. Through lectures I teach the aims of the urban survey related to the historical tradition of Italian by the explanation of : methods and tools for the survey and analysis of the environmental context (the relationship between the natural and built environment, the reference cartography, the importance of environmental data and the definition of its qualitative values); methods and instruments for urban survey trough urban cartography of reference, the importance of qualitative and quantitative data of urban areas, the coding systems, critical reading of the urban fabric of the city center (training and later stages of growth), the reading of vegetation, the cataloging of data and compilation of

technical-descriptive summary; The relationship between environment reading and project.

Essential to the proper approach for this type of research is was the seminar of the theoretical approach to critical reflection on: urban responsibility of the project also through the study of the territory (the geomorphological characteristics, development elevation, hydrography, climate, exposure, natural and anthropogenic, roads and infrastructure ; Analysis of visibility: a study of mapping with the observation points from the coast and from internal routes with the identification of the prominent elements, incongruous and congruous.

The active conservation and redevelopment of places require interventions to integrate the objectives of preserving the historical and socio-economic landscape with the revitalization and improvement of the existing conditions in compliance with the specific regulations and guidelines at European and national levels: The European Landscape Convention, 2000; The European Charter for Sustainable Tourism (sustainable), 2000; The National Strategic Plan for Rural Development - Rural Development Program 2007/2013; Global Conference on the Urban Future, Berlin in 2000; Municipal Code of 2004 (DL 22. 1., 2004, n. 42) Municipal Plan for Cultural Heritage and Landscape subject to protection and the study for the definition of the discipline of landscape. Analysis and detection of environmental landscape values of the non-urban territory of Genoa, 1997.

Fundamental for the understanding of the relations between architecture and environment is the 3d studies of the territory and of the settlement (AutoCAD and Sketch Up)

During the lessons in the computer lab tutorial videos are viewed online in the original language with application examples of specific items of use of the program.

Survey and analysis of the landscape , is conducted following a method characterized by three types of approach CHRONOLOGY-STRUCTURAL-PERCEPTUAL:

1.chronological analysis History and layering of events and speeches; survey of the evolutionary tracks; identifying overlapping and permanence. This first phase of the investigation provides the study and analysis of the effect of permanence of resources in the area: both agricultural areas, rural and coastal areas that urbanization, large equipment and infrastructure, with the identification of land and areas subject to pressure.

2. structural Analysis : Mass point of survey instruments designed to identify and compare the status quo with respect to natural and human systems.	Natural System: Geomorphology, Hydrology, Vegetation, position, geological indicators, main ridges, river network. Anthropic System: settlement (rationalize data relating to Urban, peri-urban, industrial, rural, cultural, infrastructure; system of green (Open spaces, green areas, historic parks and gardens) and the agricultural system (systems of agricultural landscape, land use , water systems management)

3.Visual-perceptual analysis : perceptual , social and cultural Characters,: preeminent value characters, Emergencies visual points of imbalance. Visual planes, scenic spots: areas and scenic routes, visual variety paintings, openings visual, obstructions visual

Visual pictures: beauty scenic, natural areas, main routes, historical and cultural identity; isolated elements, beauty of the whole, accessibility.

Il corso si articola in lezioni teoriche (30 ore) e in esercitazioni pratiche (30 ore) di tipo sia tradizionale che informatico. Le esercitazioni pratiche sviluppano in elaborati grafici, visite esterne ed elaborazioni al calcolatore alcuni temi degli argomenti di lezione, secondo un processo di apprendimento continuo e coordinato tra teoria e applicazioni.

The course consists of lectures (30 hours) and practical exercises (30 hours) at the pc stations. The practical exercises develop into drawings, external visits and elaborations to the computer some of the themes of the topics of the lesson, according to a process of continuous learning and coordinated between theory and applications.

References

G. Pelelgri, Sistemi infografici di Rappresentazione dell'Architettura e dell'Ambiente. Un'esperienza didattica, Graphic Sector, Genova. 2009, Italy.

Cento, Rilievo edilizio architettonico, Genova, 1979

M. Docci, D. Maestri, Il rilevamento architettonico .Storia, metodi e disegno, Laterza, Bari, 1984.

Giovanni Carbonara, Restauro dei monumenti. Guida agli elaborati grafici, Roma 1985.

P. Marconi, Manuale del Recupero del Comune di Roma, ed. Dei, Roma, 1989

M. Docci, F Mirri., La redazione grafica del progetto architettonico. Repertorio di disegni esecutivi per l'edilizia, Ed. Carocci-Roma 1989

L. Marino, Il rilievo per il restauro, HOEPLI, Milano, 1990

AA.VV., Architettura Rilevata. Didattica del rilievo per l'architetto, Bozzi ed., Genova, 1992.

M. Docci, R. Migliari, Scienza della rappresentazione. Fondamenti e applicazioni della geometria descrittiva, NIS, Roma 1992.

P.Falzone, La rappresentazione dello spazio strutturato. in "Atti del XIII Convegno Internazionale dei docenti delle discipline della Rappresentazione nelle Facoltà di Architettura e Ingegneria", 1991 Lerici, Ed. a cura dell'Istituto di Rappresentazione Architettonica, Fac. di

Architettura di Genova, 1992,

Mario Docci, Diego Maestri, Storia del rilevamento architettonico e urbano, ed. Laterza, Bari 1993.

L. Sacchi, L'idea di rappresentazione, Kappa, Roma 1994;

M. Docci, D.Maestri, Manuale di rilevamento architettonico e urbano, Laterza, Roma-Bari, 1994

R. De Rubertis, Il disegno dell'Architettura, NIS, Roma 1994;

AA.VV., Capitolato Speciale di Appalto per il Rilevamento Architettonico a Fini di Restauro, Ministero per i Beni Culturali e Ambientali-Università " La Sapienza ", Edizioni Kappa, Roma, 1994

G. Rocchi, Istituzioni di Restauro dei Beni Architettonici ed Ambientali, HOEPLI, Milano, 1994

L. Sacchi, L'idea di rappresentazione, Kappa, Roma 1994;

M. Unali, Il disegno per il progetto dell'architettura, Kappa, Roma 1996;

Cancheri G., Giordano A, Guggia A., AutoCAD_ metodo e pratica, Edizioni Diade, Padova, 1998.

P. Tunzi , Rappresentazioni d'Architettura, LdU, Pescara, 1999;

M Docci , D. Maestri, Scienza del disegno. Manuale per le facoltà di architettura e di ingegneria, Utet-Torino, 2000.

Migliari R., Fondamenti della Rappresentazione Geometrica e Informatica dell'Architettura, Edizioni Kappa, Roma, 2000.

Chitone E., Tornincasa S., Disegno tecnico industriale (vol.1), Edizioni Il Capitello, Torino, 2000.