ASA 2022 Proceedings

Architectural Science and User Experience: How can Design Enhance the Quality of Life

55th International Conference of the
Architectural Science Association (ANZAScA)
1-2 December 2022, Perth, Australia

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Forward

The Architectural Science Association (ASA), formerly known as the Australian and New Zealand Architectural Science Association (ANZAScA), is an international organisation, the objective of which is to promote architectural science, theory and practice primarily about teaching and research in institutions of higher education.

In the context of climate emergency, global pandemic and greater striving for clean and renewable energy resources, the 55th International Conference of the Architectural Science Association (ANZAScA) explores how design can enhance the quality of life. The emphasis is on the intersections of architecture, building science, urban design, health and wellbeing to increase the sustainable quality of life and user experience to make cities more liveable.

Architectural science is pivotal in informing innovative sustainable, resilient outcomes. Current technology development and trends in architectural education show an increasing interest in highly efficient solutions that closely integrate users' needs and quality of life as an intrinsic part of the design equation. This approach goes beyond building physics and shows how health, social and environmental science shape architectural responses. The themes explored in ASA 2022 at Curtin University include:

Environmental Performance
Urban Environments
Building Science Principles
Big Data
Architectural Education
Life Cycle Analysis
Beyond Building Physics

Researchers, academics, doctoral students, and practitioners have been invited to submit research papers and critical essays and to attend the Conference to widen our discussion about engaging architectural science and its future trajectories. The presentation happened in hybrid modes—face-to-face and online. This publication presents 60 accepted papers presented at the Conference hosted by the School of Design and The Built Environment, Curtin University, Perth, Western Australia, 1-2 December 2022.

The conference website is accessible at:

https://www.asaconference2022.com/

Papers in this proceedings are archived at the ASA website:

www.anzasca.net

Each of the submitted papers was reviewed by two members of our International Scientific Committee, made up of 50 experts.

While the editors of these proceedings have done their best to ensure that the material presented is accurate and free of errors, the authors are solely responsible for the contents and opinions expressed in their papers. The role of the editors was to arrange the proceedings in a logical and informative order.

On behalf of the Scientific Committee, we would like to sincerely thank all the people who have made this Conference possible. Thank you to all the authors for their valuable contribution to ASA Conference 2022 through quality discussions during the Conference and high-quality submissions, which greatly enriched the overall experience for all the attendees. We are deeply appreciative of the members of the International Scientific Committee for their thorough and meticulous reviews. Their contributions were instrumental in ensuring the high quality of the papers presented at the Conference and enabling us to continue to improve and maintain such a standard.

We are grateful to our sponsors: the Chartered Institute of Architectural Technologists (CIAT), the Western Australian Planning Commission, the Western Australia Department of Land and Heritage, the Western Australia Office of the Government Architect, the School do design and Built Environment and Curtin University. We extend our appreciation to those who have been working diligently behind the scenes to make this Conference happen Steven Feast, Hursh Ramcharitur, and Jin Zhang.

Dr. Parisa Izadpanahi and Dr. Francesca Perugia
Perth 2022

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References

Thermal performance of student-built naturally ventilated remote accommodation in Fish River, NT

For a philosophy of good construction: a learning experience

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Abstract:

The knowledge of construction techniques handed down its wealth of experience through manuals and codes of practice for a long time. The manuals of the past not only supported the construction through technical information but also expressed a 'philosophy' of good construction by transferring construction principles and rules into the project. The themes of good construction were enriched in the twentieth century by numerous objectives, among which the most significant are the industrialization and systematisation of building processes and the challenges of sustainability, from energy efficiency to the recycling of materials to building regeneration. In university education, however, the transmission of knowledge on construction stayed limited to lessons on the elements and construction techniques that declined in the various materials.While the recent global spread of computerization ensured the wide availability of technical information sources online, this phenomenon did not produce, per se, innovative, integrated and sustainable building solutions. The authors hypothesise that today's technical information is not ethically committed to clarifying the complex aspects of construction in sustainable terms.The proposed thesis considers architecture, like medicine, a “practice based on science and operating in a world of values” (Cosmacini, 2008).

Keywords: Architecture, Education, Learning Experience, Sustainable Construction

1. Manuals and good construction

The knowledge of construction techniques handed down its wealth of experience through manuals and codes of practice for a long time. The manuals of the past not only supported the construction through technical information but also expressed a 'philosophy' of good construction by transferring construction principles and rules into the project.

Until the recent past, the transmission of construction knowledge, especially in university education, was delegated to lessons on the elements and construction techniques in various materials such as wood, brick, stone, iron, and reinforced concrete. In the bibliography of the courses, the reference books recalled, even in the titles, the same contents of the lessons, which were very similar to the technical manuals in use. They were the main sources of knowledge, based on empirical and scientific information that made it possible to tackle the study of the fundamental problems of building construction.

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This tradition started with the Renaissance Architecture treaties like Palladio's four books on architecture (1570) which, building on Vitruvius' Roman text De Architectura Libri Decem, adopted a specific 'architectural philosophy' to guide the design with indications for good construction under all conditions, and thanks to this approach successfully influenced Western architecture and building literature for over three centuries. Since then, books and manuals on construction techniques have always accompanied the professional life of future designers, handing down the 'art of well-built', that is, knowledge of construction techniques, a heritage of experience and professionalism that has always been present in construction, ensuring that the design information guided the design, transferring principles and rules from theory to practice to attain high-quality buildings.

Over time, advertising has been added as the further scope of this information as an inevitable consequence of mass building production. To increase their competitiveness, building manufacturers displayed building materials and components praising their qualities, performance, and relatively inexpensive price, due to their industrial production. In America, this practice led in the early XX century to abandon the manual as a theoretical text on construction and replace it with texts rich in information that came directly from the industry world. Famous examples are the Time-saver standards for architectural design data or the Architectural Graphic Standards of the American Institute of Architects, published as a prototype in 1924 and its first edition in 1932.

2. The challenges to construction practice's knowledge transmission

The themes of good construction were enriched in the twentieth century by numerous objectives, among which the most significant are the industrialization and systematisation of building processes and the challenges of sustainability, from energy efficiency to the recycling of materials to building regeneration. In university education, however, the transmission of knowledge on construction stayed limited to lessons on the elements and construction techniques that declined in the various materials.

The growing complexity of construction and the present possibilities of accessing many sources of information, well organized and easily selectable, make it impossible to propose a design activity based on a fixed set of information. Compared to the past century, the crystallized knowledge embodied in a single manual today is no longer a sufficient source of information to design, because a vast amount of information has now become available online. Small and medium-sized professionals without the infinite resources of large professional firms are the primary users of these sources today. Notwithstanding this, we suggest that the advent of computerization and its diffusion has not led to major changes in the relationship between designers and available information. University and professional courses have not varied much, as the greatest impact of computerization on learning resources is concerned with the forms of advertising rather than high-quality and comprehensive technical information which often ended in unsuccessful attempts to replace technical manuals with web searches. Within this context, we suggest that with the development of such increasingly advanced access to data, we face a twofold problem: On the one hand, the information available online does not per se constitute knowledge; on the other, not only manuals have become obsolete, but a way of doing things consolidated over the centuries has also entered a crisis with them. A crisis that has forced architects to manage many 'specialisms' and, at the same time, to acquire and interpret an endless series of continuously updated documents, principles, and standards, which make it difficult today to access and select the essential information for choosing and designing correctly.

Empirical and theoretical experiments, conducted in a purely specialized form have added to the wealth of experiences collected in technical manuals, which demonstrates how scientific research, especially in the field of physics, has been increasingly defining useful laws and principles in the construction field. While for centuries architects dealt with the building as a whole, this approach resulted in the massive use of 'reductionist' study methodologies and applications: the simple aspects of building, have been isolated and solved separately: firstly, the loading structure, secondly the envelope and its 'thermal quality, then the interior space, the acoustics of its partition walls and so on.

In the face of a more precise understanding of some phenomena, the loss of sight of the whole building as 'context' has often led to questionable or unsuccessful choices. Further to this, the construction process changed drastically over the past thirty years, from a simple juxtaposition of a few elements to the assemblage of many diverse industrial products and components. This change necessarily involved the interaction of specialized knowledge from many disciplines in executing a building which transformed the construction into a complex operation and reduced the architect’s role from master builder to design controller, leaving to project managers the takes to lead the building process. It is undeniable that such a shift towards specialization was somehow necessary, due to the unprecedented development of new materials and better environmental systems.

On the other hand, Kieran and Timberlake, (2004) argue that while the greater availability of materials, systems and component s’ choice has favoured the specialization of many disciplines, it has equally increased the demand for much more complex skills for the understanding of longstanding problems. Today, architects can no longer govern such a complexity alone, hence why their education has to make them able to coordinate it.

3. The insufficient knowledge of the information currently available does not produce integrated innovative solutions

While the recent global spread of computerization ensured the wide availability of technical information sources online, this phenomenon did not produce, per se, innovative, integrated, and sustainable building solutions.

By their generalist background, architects investigate and design architectural objects as 'organisms' for human inhabitation, composed of parts that are harmonically and functionally connected. For this reason, any knowledge related to the subject of study must allow learners and practitioners to understand and control it, not as an isolated fact, but rather as an element interconnected with all the other parts.

Since the wealth of building methods are always evolving to respond to very different needs and environmental conditions, it is difficult to understand the built environment as a "system". Consequently, it is equally difficult to define the varied whole of elements that should contribute to forming the “construction system”. In other words, if an architect is designing the window of a building, the goal will not be to study a theoretical and perfect object, but rather a building component that serves to illuminate a room, which regulates the ventilation, controls the acoustic and thermal insulation, resists any break-in, wind, and rain. The window component is also designed in such a way that it is not fragile and dangerous for users, allows firefighters to enter in case of danger, is durable, and easy to clean, and allows you to shield yourself and close completely. The designer, in the end, needs to consider an appropriate component cost and make it easy to assemble and beautiful, as well as compatible with the language of the building in which that window will be placed. It is evident that all these needs are not solved by studying the window as an isolated object, but only by understanding the window as an element composed of parts - such as glass, profiles, hinges, closures, seals, and so on - which must be chosen through rational criteria and, at the same time, an integrated part of the building organism. It is only when the architect considers the most direct links between these important aspects of the building design and addresses them altogether by understanding how a choice of a single element directly affects the rest, that their work does not become infinite or unproductive.

Architects are usually aware of this problem, but often they limit their study to just the architectural organism, neglecting the accurate definition of the elements that compose it and limiting their interest to their generic definitions, living to other stakeholders the task of their translation into products and components and their management. Alongside substantial technical knowledge, which is necessary to operate, it is equally important to draw attention to the cultural sphere. This “need to think” approach helps identify the possible connections between design and its real consequences on building correctness and performance which might be otherwise just guessed or supposed.

4. Architecture and technology as practice in a world of values

The authors hypothesise that today's technical information is not ethically committed to clarifying the complex aspects of construction in sustainable terms. The proposed thesis considers architecture, like medicine, a “practice based on science and operating in a world of values” (Cosmacini, 2008).

It is indisputable that there is a profound difference between architects and civil engineers in their training as well as their field of activities. While the engineering profession can be considered a 'product' of eighteenth-century science (Addis, 2007), the essence of being an architect is not tied to scientific activities in the strict sense of the term. Paraphrasing the title of a book title by Cosmacini (2008) that defines Medicine as "a practice based on science and operating in a world of values", we argue that "Architecture is not a science", but rather a practice in a world of values. This difference can also assist in clarifying the eternal confusion that exists between 'Technology' and 'Technique' in architecture, due to the lexical connection between the two terms.

The confusion concerns not only the Technology of Architecture and Technical Architecture taught in the schools of Architecture or Engineering, but all the discourses that revolve around these terms, so much so that Cosmacini believes that it is necessary to specify that 'Medical Techniques' they are closer to 'philosophy' than 'know-how'. If we accepted this interpretation, even in the field of architecture we could say that technology can be considered closer to 'philosophy', while the technique is in the strict sense of 'knowing how to do’. Of course, the reasons for this difference depend on how we approach the search for a solution to a building problem. If we feel we are experts by proving that we know how to do something, without valuing the reasons why we have reached that solution, our soul is closer to that of a specialist technician. If, on the other hand, we consider the selected solution as one of the many possibilities of our creative work, we could find ourselves closer to the soul of a designer architect. Two types of mindsets derive directly from how we teach technique or technology. The engineering training focuses on equipping the student with tools for them to transform ideas into realizations, while studies in architecture aim to generate and develop ideas. When it comes to teaching technology, many questions arise. Who is right? Or, better, which training is more useful? Is Architecture Technology a corrective to the excessively 'artistic' training of the architect? If the answer is yes, what should a technology teacher be concerned about?

If we share the architecture definition as a "science-based practice that operates in a world of values", then we answer that architecture is more than a 'science', as it also includes a philosophical vision that guides technologists; only a philosophical approach to the problem of construction for spatial inhabitation can prevent from an excessively superficial training, and orient students towards a more in-depth knowledge approach. Only using such deep knowledge will they be able to consciously operate in a 'world of values'. From this perspective, close integration between practical technique and technology knowledge in the educational field is essential for a balanced education in the technology of architecture today.

On the one hand, the architect needs practical knowledge to use the information from architectural publications, even if such information is often presented for promotional purposes rather than to inform.

On the other hand, architects must enter the merits of technical choices without passively accepting materials and technologies available on the market, as the information does not clarify and guide professionals into the complex world of modern construction.

Making this information understood and best used in the design phase is one of the main philosophical tasks of Architecture Technology, as studying and defining the possibilities and limits of knowledge is precisely the task of philosophy (Jasper, 2014). As educators involved in the training of future operators in the construction field, we developed a teaching method to process information relating to construction within a system that allows us to both analytically control construction details without losing their links with the whole.

5. A learning experience

The study we present here is based on the learning experience of second-year Architecture students in the Laboratorio di Costruzioni 1B 2021/2022 (Laboratory of Construction) at the University of Roma Tre. The unit is designed on the assumption that the technological design of construction elements relies on a complex building system whose definition, especially in terms of sustainability, today requires ethically correct information to measure the real environmental and technical performance of the design choices. For this purpose, we have set up a didactic approach that uses the design and construction history of a simple building to define its sustainable performance, linking basic concepts of construction to known construction examples.

Through the comparison of a building's design and construction history with similar architectural examples, we enabled students to understand the basic functioning of building system parts and gain an organic comprehension of the design choices that defined its building system.

A new form of organization of technological knowledge based on cognitive maps representing the parts within the whole of the 'construction' system is the basis of this approach, which enables the identification, coding, and transmitting information statements to students. In this way, the single information concerning one element of the construction is delivered making evident the connections between the elements themselves and the whole of the construction to which they belong, rather than discrete parts.

Once students learned the design characteristics of the building components, such as ground connection, structure, envelope, roof, etc., they were invited to reconsider their Design from the previous semester and apply technological solutions considering sustainability needs and objectives.

The definition of such a system has been published in a series of books Morabito, Marrone, 2010, 2014) which addresses four main themes of the 'construction' system (ground connection, vertical and horizontal structure, opaque vertical envelope, transparent vertical envelope, roofing) and provides the basic information necessary for an architect to understand the rules of detailed design and construction within a system of interrelated elements.

This approach has been used as a didactic framework providing a learning pathway for second-year students that include a scaffolded and interconnected study of each element of the construction, from the ground connection to the roof composed of five steps

Step 1. Telling the story of the construction element through examples.

Students present architectural examples of technological solutions related to the construction elements studied and the drivers that identify their needs and performances to explain the choice for their use.

Step 2. Organizing knowledge by concepts.

Students build a discourse on the aspects to consider in the design of the building element using the concept map defined to establish relationships between concepts and performance parameters.

Step 3. Moving from concepts to put into practice through construction on site.

Students demonstrate, using the selected building case study, how the design concept was translated into construction through the negotiation of technological choices on the construction site that determined the correct construction sequences.

Step 4. Applying knowledge to select the preferred solution among technical alternatives.

Students design the construction element describing the technological performance and representing the succession of the construction sequences of the individual components of the element.

Step 5. Resolving the relationships between elements of the system.

In the end, students insert the detailed solution in a section of their previous semester's building design and identify how this specific building node is to be redeveloped to resolve the interrelationships with the other elements of the construction system.

Step 1. Telling the story of the construction element through examples.

In the 'construction system’, the study of construction detail is useful to understand the reasons behind the solution of a specific building problem beginning the ascent from the particular to the general, which is essential not to lose sight of the unity of the 'construction' system. Studying construction problems by selecting architecture examples in a certain order enables students to inquire about the design problem - the performance requested by a particular node and present their findings explaining the project in response to the project demand – the services to be offered. For this purpose, students describe each example in its generality to understand the construction problems as consequential to the architectural objectives. The study of technologies entrusted to the presentation of examples of constructions or specific projects is inevitably partial, as only in specialized books, can we find an almost complete, albeit theoretical, illustration of the possible technological solutions for the architecture of constructive elements (fig. 1).

For this reason, we asked students to illustrate a constructive element as exhaustively as possible through a series of examples, comparing each alternative solution to each other, and framing problems to understand the general principles behind them. A legend of individual details is proposed to students for them to display information concerning "what" elements you are talking about, “where” and "why" of their presence and "how" The architects intend to resolve or have resolved the detail. Through the ordered structure of the legend, all students can describe the parts that compose the represented element and indicate the reasons underlying that choice using a common code, which makes the characteristics of a technical solution understandable and comparable to each other.

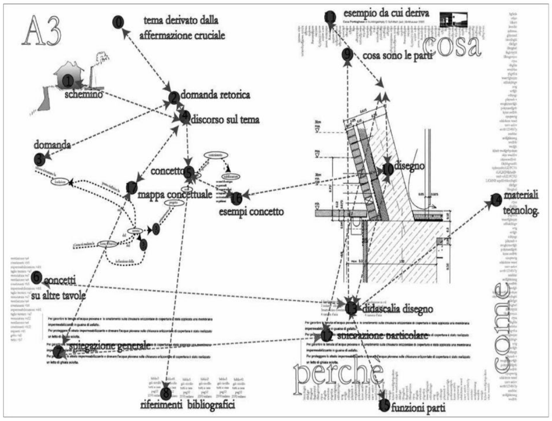


Figure 1 – Student diagram showing the connection between construction nodes

Step 2. Organizing knowledge by concepts.

The set of problems found in the various examples allows us to construct a discourse on the theme that frames the element studied in the construction system. This work derives from the application of J.D. Novak and D.B. Gowin in their book “Learning how to Learn” (1984), as developed in the aforementioned study on concept maps applied to the study of technology. For Novak and Gowin, concept maps are a form of communication and explanation, that concentrate key objects of a discourse in the concepts dealt with.

The study of each element of the construction was thus articulated using concept maps. Each set of concepts in the map identifies significant aspects of the assigned construction problem and the relationships between each component to address the technological design of each element. The desired performances were thus related to technical solutions, explaining the reasons underlying the possible adoption of different detail configurations.

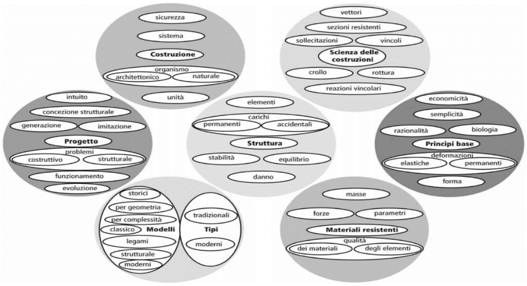
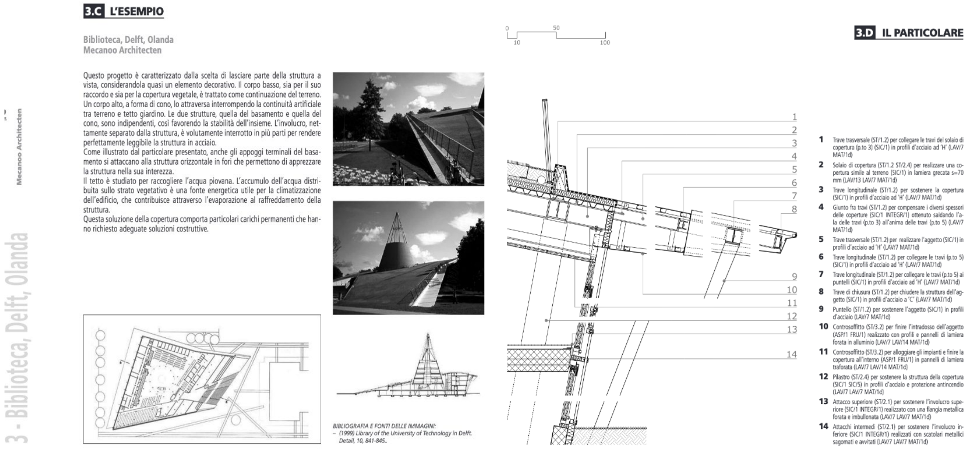


Figure 2. Organization of the structure map illustrating driving concepts.

Step 3. Moving from concepts to put into practice through construction on site.

The presentation of examples taken from the literature and the reasoned description of the various technological solutions does not yet allow students to holistically understand the performances determined by the construction needs. For this purpose, additional information about the analysed examples concerning the whole construction process is required. To address this issue, we used a real building located on campus as a reference, a teaching pavilion of the Department of Letters of the Roma Tre University, of which both the design and construction events were known. The teaching team presented the design, and the construction site of the reference building, explaining how each element of the construction and the construction sequences helped to assemble the building to perform correctly from a functional, structural and sustainable standpoint. For the theoretical treatment of each element of the construction, alongside the examples (Step 1) and the guiding concepts for its design (Step 2), the reference to a realised building played an important role, especially using the connection between components and elements to demonstrate the importance of correct design, procurement, and execution nexus to fully achieve the required building performance, locally and overall.



3.C L'ESEMPIO

Biblioteca, Delft, Olanda
Mecanoo Architecten

Questo progetto è caratterizzato dalla scelta di lasciare parte della struttura a vista, considerandola quasi un elemento decorativo. Il corpo basso, sia per il suo raccordo e sia per la copertura vegetale, è trattato come continuazione del terreno. Un corpo alto, a forma di cono, lo attraversa interrompendo la continuità artificiale tra terreno e tetto giardino. Le due strutture, quella del basamento e quella del cono, sono indipendenti, così favorendo la stabilità dell'insieme. L'involucro, nettamente separato dalla struttura, è volutamente interrotto in più parti per rendere perfettamente leggibile la struttura in acciaio.
Come illustrato dal particolare presentato, anche gli appoggi terminali del basamento si attaccano alla struttura orizzontale in fori che permettono di apprezzare la struttura nella sua interezza.
Il tetto è studiato per raccogliere l'acqua piovana. L'accumulo dell'acqua distribuita sullo strato vegetativo è una fonte energetica utile per la climatizzazione dell'edificio, che contribuisce attraverso l'evaporazione al raffreddamento della struttura.
Questa soluzione della copertura comporta particolari carichi permanenti che hanno richiesto adeguate soluzioni costruttive.

BIBLIOGRAFIA E FONTI DELLE IMMAGINI:
- *(1999) Library of the University of Technology in Delft. Detail, 10, 841-845..*

3.D IL PARTICOLARE

1 Trave trasversale (ST/1.2) per collegare le travi del solaio di copertura (p.to 3) (SIC/1) in profili d'acciaio ad 'H' (LAV/7 MAT/1d)

2 Solaio di copertura (ST/1.2 ST/2.4) per realizzare una copertura simile al terreno (SIC/1) in lamiera grecata s=70 mm (LAV/13 LAV/7 MAT/1d)

3 Trave longitudinale (ST/1.2) per sostenere la copertura (SIC/1) in profili d'acciaio ad 'H' (LAV/7 MAT/1d)

4 Giunto fra travi (ST/1.2) per compensare i diversi spessori delle coperture (SIC/1 INTEGR/1) ottenuto saldando l'ala delle travi (p.to 3) all'anima delle travi (p.to 5) (LAV/7 MAT/1d)

5 Trave trasversale (ST/1.2) per realizzare l'aggetto (SIC/1) in profili d'acciaio ad 'H' (LAV/7 MAT/1d)

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11 Controsoffitto (ST/3.2) per alloggiare gli impianti e finire la copertura all'interno (ASP/1 FRU/1) in pannelli di lamiera traforata (LAV/7 LAV/14 MAT/1d)

12 Pilastro (ST/2.4) per sostenere la struttura della copertura (SIC/1 SIC/5) in profili d'acciaio e protezione antincendio (LAV/7 LAV/7 MAT/1d)

13 Attacco superiore (ST/2.1) per sostenere l'involucro superiore (SIC/1 INTEGR/1) realizzato con una flangia metallica forata e imbullonata (LAV/7 LAV/7 MAT/1d)

14 Attacchi intermedi (ST/2.1) per sostenere l'involucro inferiore (SIC/1 INTEGR/1) realizzati con scatolari metallici sagomati e avvitati (LAV/7 LAV/7 MAT/1d)

Figure 3. Students' presentation of an Architectural Example and construction detail.

Step 4. Applying knowledge to select the preferred solution among alternative technical alternatives.

Once students investigated the functioning of a construction element, the relationships between elements and performance through alternative solutions, and understood the construction process as a whole, we asked them to analyse their project developed in the Architectural Design Laboratory in the previous semester. The analysis of their building's structural design, accessibility, fire prevention and, above all, sustainability, the definition of which was limited to some general settings, aimed at putting the technical design choices made in the previous term back into play and responding to the building's fundamental needs in light of the newly acquired knowledge.

At the end of the analysis, students identified with greater awareness bettered solutions that they could not identify in the previous Design studio, such as dimensional rethinking of spaces, in plan and section; distributive reorganization; optimization of the transparent and opaque envelope based on the quality of natural lighting and protection from solar radiation; choice of structural materials and layers' definition, with a focus on circularity, low environmental impact and reduction of CO2 emissions. In this phase, students deal with a partial re-design which starts from the identification and understanding of the technical reasons for their design rather than a response to the site and brief.

Having re-defined the framework of the building requirements, students identify one or more significant sections representing their project and rebuild them element by element starting from the structure that constitutes the supporting framework. Starting from the evaluation of alternative solutions' performance, the selected solutions for the single elements of the construction system are gradually added to the structure. Only after identifying the most suitable solution, do the students draw it, initially component by component, describing the sequence of construction operations on-site step by step, then inserting it in the reference section.

Step 5. Resolving the relationships between elements of the system.

After repeating steps 1 to 4 for each element of the construction system, the section begins to be defined, but at the same time the themes of the interrelation between the different elements become evident and, above all, it becomes necessary to verify the figurative/architectural outcome of the whole, exactly as it happens in a real design process. This operation, apparently easy to perform, requires the development of a competence that goes beyond the correct application of the acquired knowledge. It involves the critical design skill to control more aspects as a whole and translate the choices into the desired architectural configuration. In this phase, students experience first-hand how their choices, sometimes *impromptu*, are challenged by needs of a different nature that require a synthesis not only through the maturation of the acquired knowledge but also the individual capacity to control and reinterpret the architectural expression of the construction.

Conclusion

In an interview published a few years ago, the philosopher Carlo Sini, addressing the problems of information interpretation, argued that the internet is only a medium for its transmission (Cannata, 2010). He convincingly asserted that information, if left to itself, generates disinformation. This apparent paradox is valid also for architects. One just needs to browse online through a 'technical' magazine in which even well-documented details of construction elements, while providing additional information to a professional's training background, lack any critical note, which would help understand the real validity of the solutions presented. The potential designer-reader is left with the task of evaluating the solutions trying to understand if they are dictated by formal needs, or if they have interesting and innovative results such that they can be reused in different constructions. The information that a cultural professional can retrieve from trade magazines is, in general, very superficial.

It is believed that nothing 'more' is needed, but this 'more' is precisely the missing information that generates disinformation. It is that kind of misinformation that leads to designing and building kitschy projects, as evidenced by the long series of poor building copies that Frank Gehry's Guggenheim Museum has generated. Instead, appropriately structured information is needed to explain the reason for certain exceptional constructions that students and technology teachers look at very carefully. It is necessary to understand what qualitative improvements the innovative ideas bring, concerning the needs of comfort, maintainability, durability, safety and sustainability, so that they can be extrapolated for future use.

The architectures presented in technical architecture magazines do not explain the constraints that led to the choice of specific solutions. Unfortunately, the information contained in commercial publishing seems to consider, for example, engineering conditioning as marginal or does not provide measured characteristics of environmental performance. Correct and exhaustive information on all aspects of an experiment would guarantee complete control by entrusting it to the figure of the architect, which has always been the antithesis of any specialism.

It is with this spirit that the teaching experience presented here was set up, in the awareness that in a technological design laboratory, technical knowledge should turn into critical skills starting from the case studies, to understand the sustainable and architectural value of possible choices between many alternatives. In other words, the attempt was precisely to move away from the logic of technical manuals, to build a philosophy capable of guiding students in choosing technological solutions and, above all, governing them as non-specialist architects.

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