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THE GIFTS OF PROMETHEUS. PROFILING ARCHITECTURAL EDUCATION IN A FAST-CHANGING WORLD

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Abstract

The reconsideration of architectural education in light of a new reality emerging from the fast changes occurring in our social, cultural and physical environments is now imperative. In order to divulge the incompatibilities of the existing educational structures with the current dynamics of change, three main aspect of our contemporary architectural education are examined: the system of studies, the contents of studies and the architectural design pedagogy implemented by Schools of Architecture.

Concerning the system of studies, amongst other issues we speculate on the limited agility of the system to host innovations, its dominant conceptions about the teacher's profile, its unclear way to define the profile of the graduate and the obscure relationship between architectural academia and professional practice. As to the content of studies amongst other issues we speculate on the impoverishment of humanities in architectural studies that caused a passive technicality which, fascinated by the digital tools, sterilizes architecture from its cultural and human values and meanings.

Further observations concern current pedagogy and its reservations on the fear for mistake-making and risk-taking, on the methodological rigidity of design education founded on what is wrong and on not what could be done on a speculative basis, on the attitude to (over)simplify complexity, on the passive inclination and docility towards certainties, on the resistance to change, revisit or renew teaching practices.

The paper concludes by presenting the basic lines of the priorities architectural education has to consider in order to be able to critically follow the new paradigm emerging from and imposed by the new philosophical understandings of our world and the consideration of the new normal that is ascribed to them as a new ethical statement that profoundly affects architectural contemplation and practice.

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1. Think, imagine, make

Every child is an artist. The problem is how to remain an artist once we grow up.
Pablo Picasso

When the gods decided to attribute traits to living creatures, they entrusted a pair of Titans to undertake the task. The one was Epimetheus, whose name, in Greek, means "hindsight", or literally the "after-thinker" and the other one, his brother Prometheus, whose name means "foresight", or literally the "fore-thinker". Prometheus attributed a positive trait to all animals and left with his brother the completion of the task. However, as Epimetheus had no ability to foresee, when it was his turn to attribute to humans a positive trait, he realised that there was nothing left. Prometheus, very disappointed with his brother's performance but also with his own fault, stole from Zeus the fire and from Athena, the Goddess of wisdom, curiosity and imagination and gave them both as gifts to the humans. He was severely punished for his crime to give to the humans something that belonged exclusively to the gods and that would enable them to observe, imagine, invent, create, use and develop tools, techniques, machines and technology, but also sciences, arts including architecture.

It is true that curiosity, imagination and technique are the main constituents of creativity and innovation, all three absolutely necessary for any advancement in science, society and culture. For architecture, curiosity and imagination are the most important traits of an architect's profile and must, consequently, constitute the core of the objectives and strategies of architectural education. Curiosity constructs the foundation of architectural knowledge. Imagination is the basis of expression and representation and the fire enlightens the technique and the technology of making. To think, to imagine and to make are the three main pillars of architecture.

The act of architectural creation can flourish only through the dynamic interaction of all three of them. As a consequence, the structure or the system of architectural education has to assure the direct, adequate and inspiring support these pillars can offer to the design studio. The content of architectural education has to anticipate their integration rather than their insular consideration that can only lead to stagnant fragmentations. Last but not least, architectural education as pedagogy has to unleash the inherent creativity of the learner enabling them to innovate by suggesting new forms of affective and effective associations amongst thinking, imagining and making.

A number of contemporary education scientists and pedagogues advocate that, till the end of the 20th century, our entire educational system, at all levels, was organized in a way that annihilated learners' inherent curiosity and imagination. With the dominance of the rationality that characterized the sciences and the doctrinal belief in the existence of one and incontestable truth, this education system progressively hindered the inherent imaginative, creative, inventive and innovative capacities of the learners, depriving them from the necessary assets to navigate in the contemporary fast-changing world. Architectural education was no exception of this condition.

2. Architectural education and change

The only way to make sense out of change is to plunge into it, move with it, and join the dance.
Alan Watts

Architecture, as a cultural statement and manifestation of our life in space, and architectural education as the institutionalized practice assuring skills and competences for this statement and manifestation, must seek new considerations compatible with the fluid environment of the globalized economy and information society. The way we conceive architecture affects the way we teach architecture. As the considerations of architecture change over time, our educational practices are called to follow these changes. This premise charges architecture and architectural education with the task to constantly elaborate (re)define or (re)structure their set of values and principles, knowledge, skills and competences, tools and means, as well as priorities and preferences, formulating innovatively each time the emergent, new architectural paradigm in practicing and teaching architecture.

Schools of architecture seem to be rather resistant to change. Different types of old curriculum models and outdated contents or implemented pedagogies have a serious impact on the education offered. These old structures refuse to respond creatively to the fast changes that occur in the architectural avant-garde and in architectural practice. Schools appear rather passive and unable to follow these changes. Such significant time lapse affects the quality of architectural education, and the potential influence architecture graduates have on professional practice as well as on society and culture. As the pace of changes nowadays becomes increasingly higher, this attitude of schools threatens their credibility, reliability, authority and reputation with direct consequences on the esteem, status and role of their graduates in the already unstable professional market. This renders the management of change increasingly an imperative request for the academic leadership of schools of architecture.

This imperative necessity of a radical reform of our educational structures presupposes a constructive dialogue amongst all the stakeholders of both academia and practice, which must focus on the crucial issues concerning architectural education such as: What do we teach when we teach architecture and architectural design? Why do we teach what we teach? How do we teach what we teach? Why do we teach the way we teach? Who teaches what must be taught? When do we teach what must be taught? Who is the learner and how does (s) he learn? What is learning in architectural education? However, this dialogue, no matter how long, remains unproductive as it develops on vulnerable grounds. It primarily and consciously focuses on technical issues of architectural education like the total duration of studies, the duration of cycles of studies after the suggestions of the Bologna Accord and other European directives, on the financial aspects of architectural education, on staff and student mobility, on the necessary technical infrastructure that schools must have nowadays, on the administration structures and the inter-university collaborations. Once this discussion has tackled practicalities and policies and delves into the question on how to educate contemporary architects, the question that inevitably and naturally follows is “what architecture is”. From this point the debate departs from the area of education to wander in the labyrinths of different and divergent views and definitions of architecture. This way all crucial questions of architectural education are left unanswered.

3. New architecture, new challenges, new questions

Creativity requires the courage to let go of certainties.
Erich Fromm

Over the last fifteen years new terms, notions and concepts have emerged in our architectural vocabulary. Liquid, hybrid, virtual, trans, fluid, emergent, animated, seamless, interactive, parametric, machinic, self-generating, are all relatively new terms that introduce a new culture where change is replacing stability and solidity and complexity are replacing simplicity and clarity –terms and values that have nourished architecture for centuries. The reconsideration of architecture and architectural education in the light of this new reality is now more than necessary. We must restructure the discussion on architectural education on the basis of the contemporary conceptions of architecture and the humans to which it is addressed and (re)consider the fundamentals of architectural creation on which all different conceptions of architecture are built.

Nowadays, the central role of IT in both generating a form and turning it into a building seamlessly, the complexity of a world informing design and construction, the galloping technological advances in building techniques and the emergence of new materials and components render the issue of reconsidering architectural education more acute. The emerging paradigm of parametric, algorithmic or computational architecture has brought about a radical change to what we have been accustomed to until it turned up³; that is, the transformation of values such as mutability, adaptivity, transformation, flexibility, affordance, individualization, personalization, customization, intelligence and ecology into built form. A new perception of creativity, innovation and experimentation on architectural forms and materialities is therefore called in to accommodate the transformation of the unstable into a new perception of architectural creations, construction, detailing, and nodal points and to redefine established perceptions of the building as a whole.

In the current unstable, fluid and unpredictable political environment of the international economy nowadays, schools of architecture are facing significant changes in their finances, the available human resources, their infrastructure, a condition that directly affects their academic profile. To be adapted to this unstable, fluid, and unpredictable environment, schools of architecture are reconsidering their development strategies (if they have), to reform their curricula, redefine the management of their technological infrastructure, reconsider their policy on international contacts and collaborations, consolidate programs delivering degrees and educational possibilities in order to remain sustainable in this new context. However, the majority of schools carry on with their educational practices in apathy without making any significant changes in the logics, the principles and the priorities of the services they offer. The request for quality of the education offered by institutions remains urgent, acute and critical as the competition amongst schools of architecture becomes fiercer, as a result of the growing

³ In the Modern paradigm the clear-cut distinction of the parts of a building associated materiality with the idea on the unique resolution of nodal points that connected the parts, all assembled producing the overall building. The transformation of the values of the given intellectual and cultural context of democratization, internationalization, and the perception of the human being as a regular modular but central in world was achieved with the use of standardized components made of not so traditional or local to the building site materials. Edward Ford, *The Details of Modern Architecture* (1990).

competition of the degrees schools offer in an increasingly difficult and competitive professional market.

In the same time, there is a significant shift in the conception of higher education from an input-oriented education to an outcome-oriented one, from the priority given to teaching to the priority given to learning. This shift is encouraged by the sciences of education and is supported by EU policies. We are nowadays increasingly speaking about learning and not teaching, as through the former we can investigate a number of parameters architectural education is dependent upon, beyond the teaching skills of the teacher and the efficiency of the implemented teaching method. Learning is a student-oriented concept, a competences-based reference and an outcome-centred consideration. Teaching is a teacher-oriented concept and an input-centered consideration of the education. It is increasingly accepted in the contemporary debates on architectural education that the quality of learning has to remain the central axis of the strategic development of schools' of architecture and its fostering appears as their most urgent priority.

Are our schools ready to accommodate all these fast changes? Is their teaching staff ready to cope with this emergent new paradigm in architecture and architectural education? Can they develop strategies to manage the changes occurring in architectural practice, experimentation, research and education as well as in the sciences of education and the advancements in pedagogy? Are they able to update the learning, imagining and making in a way compatible and in line with the main trends of contemporary architectural contemplation and practice?

4. The content: Thinking - imagining - making in the new paradigm

The one exclusive sign of thorough knowledge is the power of teaching.
Aristotle

In the history of architecture the relationship between thinking, imagining and making has been challenged between extremities of total isolation to total integration. There have often been conflicts between thinking, imagining and making architecture to the extreme of one overshadowing or even invalidating the other. On the one hand, the 19th century Arts and Crafts Movement primarily focused on the tangible qualities of craftsmanship. On the other hand, new ideas on architecture that were never built were dismissively⁴ characterized as 'paper architecture' (Utopia).⁵

The industrialized economy in the Modern movement introduced an interesting articulation of these extremities. The industrial production, according to Le Corbusier, is not the production of objects but a world of intellectual constructions, of formal languages and information⁶. This new relationship between materiality and the intellect, between craftsmanship and thinking

⁴ In her course "Archigram and its Legacies: London, A Technotopia", Annette Fierro discusses the preoccupation of Archigram with technology: "Coming into the present day, Archigram prophesied, to an uncanny degree, the extensive use of technologies that are environmental, or based in information and communication, and mass fabrication in new materials of organic or plastic characteristics" "Work 2005/2006" (2006).

⁵ Manfredo Tafuri, *Architecture and Utopia. Design and Capitalist Development*, (MIT Press, 1979)

⁶ Le Corbusier, *Towards a New Architecture* (1931)

processes, seems to be under redefinition in the non-standard architecture of our days and, at this crucial moment, it is imperative to support, enhance and sustain the thinking process as the necessary regulating factor in the loop between technology and culture.

Nowadays, we can observe a progressive impoverishment of the humanities in architectural curricula, which, in most of the cases, are replaced by modules related to more technical developments of IT applications to architectural design and construction. The humanities have significantly lost their role in the design decisions. Cultural sensitivity and particularity that dominated architectural design in the seventies and the eighties have disappeared from the architectural discourse, legitimizing designed buildings. In most publications the contents focus on the process of generating non-standard forms and marginally refer to the social and cultural impact of the outcome of this process. If our educational system is becoming more technical, procedural and intuitive how we can then efficiently cultivate and develop creativity and innovation?

Can innovation stem from a technical thinking alone? Can competences that encourage innovation be assured in an educational system with the thinking on humanities marginalized? Established educators such as Ken Robinson⁷ agree with a recent survey by Newsweek⁸ that the association of ranking mathematics and sciences as the top subjects in the education of future innovators is wrong⁹. In acknowledging the inherent complexity of our times and, without undermining the invaluable contributions made by distinguished scientists and engineers, Alan Brinkley remarks that this world would be unimaginable without the great works that have defined culture and values. In his article "Half a Mind is a Terrible Thing to Waste"¹⁰ his suggestion to all educators, clearly architecture educators included, is the balance between equally cultivating the sciences and the humanities that put the world together¹¹. The recent changes in architectural thinking and creating also affect the conception of the relationship between matter and form. Any material is conceived nowadays as having endogenous tendencies and capacities (affects). Simple materials have inevitably simple

⁷http://www.ted.com/talks/lang/eng/ken_robinson_says_schools_kill_creativity.html. Sir Ken Robinson in his lecture at TED explains that intelligence is diverse, dynamic, interactive and distinct while creativity is the process of having original ideas that have value. He stresses that only the acquisition of skills in maths and sciences is a hindrance to creativity as their prioritisation in the education globally is artificial and derives from the needs for highly numerical scientists to be employed since 19th century Industrialism and has not been re-considered since.

⁸ The survey indicated that the Americans are losing ground in their ability to innovate, as opposed to the Chinese. The possible explanation is that the former place the emphasis of their education on maths and computer sciences (52%) and undermine the creative approaches to problem solving (18%). The Chinese believe that in order for their children to drive innovation they need to cultivate their skills on creative approaches to problem solving (45%) and less on maths and computer sciences (9%). Daniel McGinn, *The Decline of American Innovation* (2009)

⁹ That has been a hot topic for a long time: Cyril Stanley ('Matter Versus Materials: A Historical View', in *A Search for Structure*, Cambridge, Mass: MIT Press, 1992), a historian of materials describes in his book the erroneous clear-cut distinction between craftsmen and philosophers from ancient Greece that was soon dissolved when science was more keen on looking into the 'problematic' topological versus the 'axiomatic' structures as described by Gilles Deleuze and Felix Guattari in *A Thousand Plateaus* (2002)

¹⁰ Alan Brinkley, *Half a Mind is a Terrible Thing to Waste* (2009)

¹¹ Along the same line Alan Nevins asserts that for him, "the humanities are not simply vehicles of aesthetic reward and intellectual inspiration, as valuable as those purposes are. Science and technology aspire to clean, clear answers to problems (as elusive as those answers might be). The humanities address ambiguity, doubt, and skepticism -essential underpinnings in a complex and diverse society and a turbulent world....it is almost impossible to imagine our society without thinking of the extraordinary achievements of scientists in building our complicated world. But try to imagine our world as well without the remarkable works that have defined our culture and values. We have always needed, and we will need, both." Alan Brinkley *Half a Mind is a Terrible Thing to Waste*, in *Newsweek*, November 21, 2009, p 45.

capacities and tendencies, which restrict what DeLanda¹² defines as 'self-organizing capabilities of matter', but complex materials are those in which many things are left 'active and affective', non-linear and closer to form the topological rather than the geometric representing, or what Deleuze¹³ defines as "hylomorphic model". The latter have complex and variable behavior raising their morphogenetic potential. This potential is considered as a core concept in the way that the new paradigm perceives materiality since it manifests the continuously variable behavior of the matter as a value, assuring the continuum between form and its generation through the exploration of its materiality. Form is conceived now as teased out of an active material and part of its design is to define the properties of continuous variation of its materiality¹⁴.

This new conception on materiality opens up the way towards the use of new materials and, more often, composites with specifically designed-coded properties, accompanied with a strong tendency for experimentation and innovation. This conception of continuum is experimentally implemented also in the production of architectural forms. Technological advancements of computation give the possibility to use the same digital outcome of the design process as the basis of the digitally driven fabrication of the designed parts of a building.

This process called from file-to-factory (f2f) introduces a new mode of production of building components. It is already implemented in many sectors of industrial production using materials that belong to the traditional palette of materials familiar in the building sector. Therefore, our educational system that founds its teaching on existing materials can rather easily incorporate f2f practices and familiarize future architects with this mode of production. However, even though many schools have already the available technical infrastructure, they marginally capitalise its potential in the educational process. Some educational environments have already absorbed this tendency by declaring the experimentation on forms and new materials as one of their educational priorities, and by defining innovative and creative thinking as the most significant competences of future architects.

The f2f process has a significant efficiency with the existing materials, but its principle operational value remains unexploited by schools, that are the enormous possibilities it can develop through new and non-standard materials. By incorporating in its capacity both standard and non-standard materials, f2f represents a mode of production which, supported by the advanced technological developments of our times, broadens the spectrum of production possibilities and consequently encourages experimentation, creativity and innovation. In this broadened spectrum, the standardized is just a small and less significant part, just one version of the possible and not necessarily the most appropriate or the most valuable one. This conception of the standard changes radically the established conception of beauty and aesthetics, something that finds significant resistance in the established architectural education system.

¹² Manuel DeLanda, *Material Complexity*, eds. Neil Leach, David Turnbull & Chris Williams, in *Digital Tectonics* (2004).

¹³ Gilles Deleuze and Felix Guattari, *A Thousand Plateaus* (2002)

¹⁴ James Edward Gordon, *The Science of Structures and Materials*, (1988).

5. The system: From the fragmented to seamless and continuum

If you always do what you always did, you will always get what you always got.
A. Einstein

In fact, our existing educational system is constructed on the basis of a process, where architectural knowledge as a whole is split into smaller subject areas, which are further split into smaller courses and modules, thus creating parts which have to be taught in order to reconstruct the fragmented whole of architectural knowledge. In this educational environment, the conception of continuity, articulation of knowledge and experiences, are rather absent. Schools have difficulties controlling how the synthesis of students' knowledge could be achieved most appropriately and systematically. The system can only evaluate a result of articulated architectural knowledge that has been built up in students' minds and consciousness, but which has never been systematically taught or strategically organized. Fragmentation is a fact not only in the form of organization of studies but also a kind of viewpoint in educators' consciousness and, to a certain degree, in students' perceptions. A direct consequence of this perception is to consider this continuum as a unification of fragments and not as a unique, seamless process. The fact that different professional bodies and specializations are involved in this process makes it more difficult to overcome the handicap of fragmentation. It appears to be necessary to open up the debate on reforms of our educational practices in order to make our institutions more responsive to the new, innovative and emergent in architectural creation.

Although society is more apt to embrace changes, schools of architecture as it was mentioned above remain somewhat resistant to any avant-garde. The emerging architectural paradigm is based upon the extensive use of digital technology through which forms are generated as the digital representation of a script articulating modifiable parameters depended upon predefined relations. In this reality, the teaching of architectural design is often dominated by the technical aspect of the use of software or the creation-modification of this software. This fragmented approach to the new, encouraged by the fascination for the forms created by digital means as expressions of an 'other' promising world, turns students often towards a formalistic aspect of architecture, disconnected from a theoretical discourse and a consistent content of their design proposals. How can we, the teachers, teach our students to translate the new set of values of our society into architectural principles and then into architectural designs without being 'imprisoned' in the technicalities of scripting or software applications?

One of the dominant values of contemporary contemplations of architecture is the seamless and continuous connection between thinking, imagining and making. However, is it possible to teach the seamless and the continuum in an extremely fragmented educational system implemented under the label of modularization in almost all schools of architecture? Theory is taught almost always disconnected from architectural design, history is organized without any relation to the theory modules, while teachers of construction do not have the most harmonious relations with design tutors. Moreover, the art education, when it exists, is secluded in its own questions and themes. Both educators and students appear to be consciously or unconsciously detached from this seamless connection.

The fragmentation mentioned above is not only evident in the internal structure of architectural education system but also in its relations with the world of production and architectural practice. Architectural education has always been close to, if not (in some cases) dependent upon the building industry and the professional practice. As autonomous institutions or as part of Universities, Technical Universities or Fine Arts schools, Schools of Architecture had always very delicate relationships with the so-called market, challenging the fragile limits of the notion of 'academic freedom', a fundamental principle and the moral basis upon which the Western European academia was founded since classical times. As a term 'academic freedom' expresses the will and the necessity of the academic community to remain the institutional knowledge generator, untouchable from the logics of any political, financial or corporal profit.

Our architectural education system is structured upon the wrong hypothesis that the profile of graduates generated nowadays will stay valid throughout their professional life or, at least, in a very large part of it. However, in the recent past we are experiencing radical changes in the way we think, conceive, create and practice architecture coupled with equally radical changes in the building industry, the construction methods, the real estate management and the investments in the domain of the built environment. All these changes generate demands for a new way of thinking architectural design for new knowledge, skills and competences questioning those who are actually ensured by our institutions. In this dynamics of change we increasingly feel unable to predict the future profile of the architect, while having serious reasons to believe that this will not be the same. We are facing a new situation where unpredictability is the main characteristic and, at the same time, a challenge.

Architecture and education as project-based activities are always based upon predictions. They develop upon predictions that society considers safe. In the past, this was true, to a certain extent, as they were safe as changes were slow. How can we organize architectural education in this new context of fast and unpredictable changes? What profile(s) of graduates we must create when we cannot safely predict what will the architects' profile be ten or even fifteen years later? What have the recent experiences taught us is that this profile will not be the same with the one that is valid at present. However, almost all schools of architecture educate their graduates on the basis of what an architect is today and what the fast-changing needs of the current conditions of the architectural profession and market are. This attitude almost reaffirms the prediction that the new architects graduating from our schools will not have the necessary competences and skills when they start their carriers and will certainly encounter serious adaptation problems. It is obvious that our institutions must reconsider their educational structures in order to make them more agile, flexible, responsive and adaptive to the fast changes of our world and assure to their graduates those competences which can best assure a sustainable architectural career.

This need is reinforced by the fact that the financial crisis has caused an average unemployment rate of 25%. In some countries, this percentage is significantly higher as the crisis has also caused an overall significant reduction of the activities in the construction sector. In this context, many architects are forced to look for other professional activities and to redefine their presence, position and responsibility. Schools of architecture must now take responsibility and contribute to the need of expanding the existing spectrum of professional activities of the architects, by assuring knowledge, skills and competences, which will render them more

flexible, responsive and adaptive in the international financial and social dynamics. This new strategy will certainly affect the contents and the structure of architectural studies. It seems rather important that the main objective of this strategy focuses on the development of the creativity of the graduates, which will give them the capacity to navigate safely in the unknown territories of future practices, priorities and values. That means that educational structures must now be reorganized in order to assure as quality of their learning outcomes high degrees of curiosity and knowledge, imagination and aesthetics as well as making skills to experiment on the fast-changing architectural materiality.

6. The pedagogy: Lighting a fire to learn, invent and create

Education is not the filling of a pail, but the lighting of a fire.
William Butler Yeats

Are our institutions able to develop the necessary pedagogy and teaching practices in order to achieve these aforementioned educational objectives? All these new targets need alternative and unconventional teaching methods and strategies, a new collaboration culture between the teaching staff, high degree of coordination amongst the different subject areas and a profound reconsideration of the studio as a milieu to develop a creativity and collaboration culture, no longer as a neutral laboratory for technical or social problem solving practices, neither as a sterile computer lab to experiment on the capacities of commercial software applications to create forms potentially considered to constitute architecture.

Our schools recruit staff either on their performance as architects or on their research record and quality. They are never recruited on their teaching abilities, which are the necessary skills to cope with the unique subject of their job: teaching. There is a kind of amateurism in the existing architectural education environments built upon the wrong hypothesis that a talented architect or a dedicated researcher is automatically a talented teacher. There is no scientific or even empirical evidence that this hypothesis has any real basis. We all know cases of good architects who are very inefficient teachers and distinguished teachers who have never been important architects or significant researchers.

It is even more bizarre that Schools of Architecture remain passive about the lack of appropriate teaching skills. Even though it is broadly accepted that the quality of learning is directly dependent upon the quality of teaching and that the quality of the teacher is fundamental for the quality of the learning outcomes, there are very limited initiatives for staff development taken from the schools. The staff development practices are strictly limited to participation in conferences and this is the first heading of expenses that is invited to absorb any kind of financial discrepancy.

In the same time, the quality of learning often is not part of the interest of the evaluation processes, which either focus on the input or the designed outputs and not on the overall quality of learning assured through the offered teaching. In most cases, we tend to evaluate the teaching practices without having a clear way to evaluate the quality of learning achieved and, even more, to evaluate the impact of this teaching in the overall learning quality achieved by the

whole curriculum. Following the contemporary pedagogics and the EU policies we are invited to implement a 'learning outcomes' oriented teaching practice in architectural design which means that we need to reconsider our architectural design education practices and adapt them to an outcome education consideration. In parallel, we must redefine our evaluation methods, not focused on the quality of the product-outcome but on the quality of the learning assured by the educational process.

This situation legitimises the common practice established in schools of architecture to teach-as-we-have-been-taught. This was certainly acceptable, to a certain extent, when changes used to take time. However, nowadays fast changes make it impossible to follow this practice as the value systems directing architectural creation have changed and consequently new teaching approaches and methods are necessary to cope with the new forms and contents of the expected outcomes. If the (hypo)thesis that the way we understand architecture is reflected in the way we teach architecture is correct, then we either teach an already outdated understanding of architecture or we use an inappropriate vehicle to help our students appreciate the contemporary trends of architecture.

If the contemporary strategy of schools of architecture has to focus on the enhancement of learners' creativity and the encouragement of their experimentation towards innovation, then the teaching approaches implemented over the past fifty years are completely inadequate. The education we have experienced over the past fifty years was primarily based upon the belief of one and only acceptable architectural truth the revelation of which was the main goal of architectural design. The problem-solving logic defined a process, which could safely lead us to this truth, known as 'solution'. Students of architecture had to elaborate proposals and the role of the teacher was to 'correct' their mistakes so that they could safely reach the acceptable, the established and the 'truthful'. The educational process was very often defined as 'supervision' of the project, and the tutorials as 'corrections'.

All the education process was targeted to avoid mistakes. In a way absolutely compatible with the dominant philosophy of the entire established educational system, the mistake was always something to be excluded, eliminated and reduced. The mistake was always punished by the educational system as the assessment, one of its main characteristics, primarily reflected the degree to which mistakes were to be avoided. This attitude introduced to architectural design education the teaching by opposition. The role of the tutor was to present to the learner what he or she should avoid and not what one had to do. In this context, the quality of the teacher called tutor, instructor or trainer, was primarily based upon his/her capacity to detect, reveal and argue on the 'mistakes' of the learner's projects so that the proposed 'solution' of the architectural problem would be corrected.

Creativity is a human resource naturally present in all humans. Ken Robinson argues that human resources are like natural resources; they're often buried deep. You have to go looking for them; they're not just lying around on the surface. In order to achieve this project, we must definitely escape from certainties and be deliberately embrace mistake. It is impossible to innovate without being exposed to mistakes. According to this logic architectural education in the emerging contemporary paradigm must be considered not as a mechanism of delivery of prefabricated knowledge but as a process of inventing and creating. Teaching, as Robinson

suggests, must not be pointed towards standardization or groupthink but to customization and to cultivation of the real depth and dynamism of human abilities. This is a very important strategic project of architectural education which schools have to seriously consider in order to be able to cope effectively with the current dynamics of the economic, social and cultural development.

7. Conclusions: In quest for symbiosis

If you're teaching today what you were teaching five years ago, either the field is dead or you are.

Noam Chomsky

From all the above, it becomes evident that as teachers we are all confronted with the challenge to reshape our educational environments in order to meet the demands of a fast-changing world. Even though we all recognize the need for change, in our everyday educational experiences, the key word is not so much the change itself, which in any case has framed all the recent developments of our educational system, but the speed of this change. The speed of change appears to be the central issue of our educational environment, which profoundly affects our teaching strategies and pedagogical approaches.

Even with difficulties, we can certainly adapt the architectural education we are offering so that our students will be responsive to this fast changing world. The forms of education offered till now appear increasingly insufficient to cope with the new demands of practice, the fast growth of the variety of building materials, the implementation of new construction methods and techniques, the variable expectations of the clients, the liquidity in the financial and political dynamics in the globalized economy. It is no longer possible to teach the same way we were taught. We must restructure our curricula in order to be appropriate for an unpredictable profile of the graduate architect, since we can no longer envisage the context in which our graduates will operate. We can no more apply the same educational and pedagogical strategies to students who are nowadays exposed to unpredictable, multiple stimuli, knowledge and images reaching them through the digital infrastructure available. An architectural design course can no longer be taught in the same way when the term for the space in which it is taught changes from atelier (1950s) to laboratory (1960s) to design studio (1970s-80s) to lab (1990s) to cyberspace (2000s-). We cannot teach the same way we used to teach people who have no free-hand sketching skills but have incredible dexterity in texting. We cannot implement the same pedagogical approaches for our students who read and write less but see and hear more...

The gifts of Prometheus gave to the humans the possibility to think before, to be proactive and to become rational. However, very often the real value of this offer has been questioned due to its negative consequences like wars, crimes, environmental damage, and different kinds of catastrophes, social conflicts, discriminations and injustices. Epimetheus' negligence was considered to be more beneficial for the humans keeping them close to nature and its materiality, rendering them more critical to the experiences, facts and gains of the past. Making reference to this myth, Plato in his Protagoras (320d–322a), introduced politics as the appropriate mediator between thinking before and thinking after, that is to say between thinking of the future and thinking of the past.

Change registered in all architectural creations and architectural education initiatives, goes hand-in-hand with things that do not always entirely change. In every change, there can be something solid, something left, maintained or preserved, and at the same time different from what it was. There is always something known, used, experienced and tested. But at the same time, through practicing or teaching architectural creation we introduce invention, change, transformation, alteration towards the liquid, the unknown, the risky, the mistaken, the intentionally uncontrolled. After that the profile of the architects that emerges is never entirely new, as it is part of what already exists in its conceptual and physical ecosystem.

This is exactly where we have to find the dynamic equilibrium between thinking before and after in architectural education. There is an ethical basis in this particular relationship between the stable and the transformable: it is not hierarchical. It can occasionally acquire different accents by different priorities, associations, gravities and magnitudes. This relationship also affects the way we look backwards or forward; the ways in which we construct myths to invent, predict, imagine and anticipate the future and the ways in which we think, analyse, memorise and investigate the past through its already constructed mythologies. Nowadays the ethical attitude emerging from the socioeconomic context is to avoid looking only ahead (like in Modern times) or looking only backwards (like in Post-modern times). The invitation is now to contemplate the future together while critically considering the past. To creatively imagine the myth of the future, but also to critically analyse the myths we created in the past: to invite and accommodate in this contemplation both Prom(y)theus and Epim(y)theus symbiotically.

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