Title – Education. Responsibility. Sustainability.
Teaching the Teachers of the World

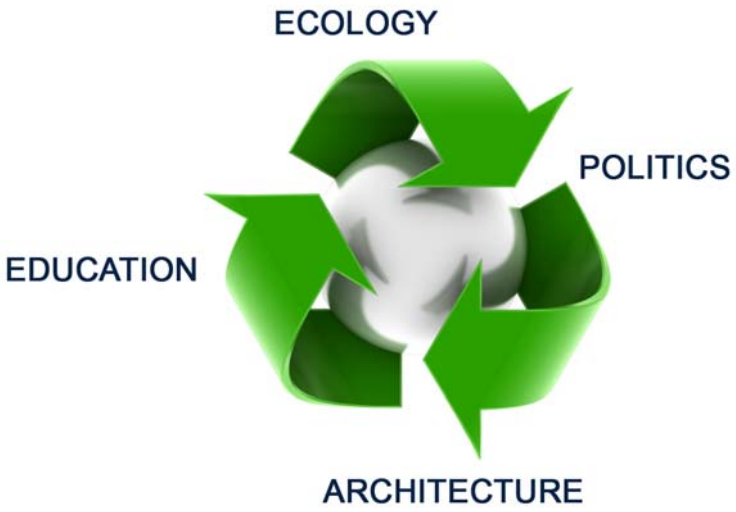
"It is in fact a part of the function of education to help us to escape, not from our own time - for we are bound by that - but from the intellectual and emotional limitations of our time."

- **T. S. Eliot**

Abstract

The teaching system provides basic information for all future professionals and even if the path of each student will be marked by evolution and change, the first years represent the creation of thinking patterns that will guide him for the rest of his future career. The paper tries to underline the responsibility of each teacher to stimulate those thinking patterns required to make the students understand their future role in the makings of the world of tomorrow and understand the problems of today.

Eco-thinking is not an experiment, a trend that will go away with the change of fashion but a responsibility to all who, empowered by their profession, influence and respond to the welfare of the many.



1. Ecology and Politics

So many people placed their hope in the COP 15 summit in Copenhagen this year and we have seen how beautiful words became dust when the powerful nations of the world had to make a decision together for the benefit of all mankind.

We stand at the precipice of our civilizations biggest threat and at the end of what people believed to be a life changing summit we find ourselves, again deceived by weak promises.

Emerging economies find themselves threatened by the CO2 restrictions imposed by the draft agreement. For India and China especially environmental regulations are seen as a block for economic growth and in situations such as these the desire for economic supremacy shadowed by the current economic crisis make ecological concerns disappear even if we find ourselves in our planets critical hour.

People from merging economies have grown with an artificially created image of lifestyle where one's social status is defined by the material goods one possesses. This phenomenon was normal as long as only a couple of hundred million could actually attain the financial level required, but now we face several billions that want to reach the same status.

Our planet simply doesn't have the resources to offer everything to everyone …. so what do we do?

Politics has spoken in Copenhagen but all political decisions filter down to those people who are in the position of taking real action, to those people who make decisions become the reality around us so it is time for us as architects and teachers to act and do our part in the forging of our future.

Developed countries were the first to feel the environmental pressure; the first environmental concerns appeared in developed countries because they faced the consequences of mass consumption before the rest of the world. Soon after the first solutions and regulations appeared (1) but it took decades to actually raise the question. We don't have the same decades for the rest of the world. Emerging economies like China or India represent almost half of the world's population, and the increasing demands of their populations will put an enormous strain on the resources of the world up to their breaking point.

Europe can be an example. Considering the landmass, Europe represents the largest concentration of culturally diverse populations, even if they are connected by a common ancestry and history, every area has its own

differentiated cultural, social and psychological characteristic. Our capacity to stand together and find solutions to the crisis of our time will be an example of how different cultures can find common ground and unite against adversity.

The problems we face today are the result of weak political will and the consequences are for all of us to endure.

2. Politics and Architecture

"Architecture is Politics" – 2008 Venice Biennale motto

This statement was made to underline the powerful bond between political decisions and the resulting architectural products. The question that rises in the aftermath of the COP 15 summit is what happens to architecture and to architects if we continue to be a resulting effect of weak political strategy; where does our professional responsibility fit in the grand scheme of things. The crisis that we all share is not only the result of political decisions but the lack of self responsibility towards ones actions: "Why should I care when the world doesn't ". This is the main reason why the world faces this crisis, without the evolvement of each professional to do its part not only in the benefit of its client but the community and the society as hole we will slowly watch or civilization crumble starting with ecological disasters and mass migration and ending with a primitive struggle for the last resources of our world.

As apocalyptic as it sounds the numbers and graphics are there, if we don't change the way we think and do things we will destroy our world and even if the task seems too great for any one person, together with our students we can offer new perspectives and solutions.

The hundreds of universities of Architecture in Europe "produce" tens of thousands of students each year, these new professionals interact with the larger population through their projects and their ideas. After graduation they become the instruments that build the future. Every single future architect is endowed with

his own drive to evolve as a professional but he is also enriched with the information that he receives within the university he followed. We cannot force the inner drive of each student but we can bring them face to face with the challenges that they are going to meet and give them the basics in the ecological and social problems they will face in the near future at a much more accelerated pace.

The architect represents a powerful medium in the workings of a society and he has the power to influence, convince and teach the general public. In a general statistic more than 60% of all financial power of a nation is invested in construction, whether it is residential, public or infrastructure it represents a huge undertaking and effort. Architects, through their experience, have a relative control over the way these investments and resources are used. In the use of global resources lies the greatest responsibility of the future practitioners of architecture, in the ongoing game of compromise and persuasion between the architect and the client lies the possibility that the architect can introduce solutions that represent both eco-pragmatism and esthetics.

From this point of view the architectural teaching shouldn't see the students as just empty cups waiting to be filled with the wonders of architectural knowledge but also as the future practitioners that will have the power to employ a certain level of influence in the direction where the future investments of the world are going and the solutions chosen to solve certain problems.

The study of architecture has evolved throughout time; this evolution is required once again to push architecture towards the progress of our present and future. If we have merged new technologies and theories into the teaching process, the ecological crisis that faces mankind today makes the introduction of ecology at a theoretical and practical level mandatory in the curriculum of every university.

We teach future teachers, every student will became a messenger for the public, a messenger of awareness and new ideas and solutions that can offer intelligent alternatives without endangering the climate but responding to the overgrowing needs of a an ever-changing civilization.

As the Venice Biennale motto says: *Architecture is Politics* but it should be politics only when political will represents a force for the benefit of all, otherwise architecture becomes an accomplice to the ruin of us all.

3. Architecture and Education

The theme of this years EAAE competition is meant to underline the need for change in architectural education in the face of climatic change. We live in a polluted world and polluted cities, we are running out of resources and the population is growing at an incredible pace. 7 billion is the new record, soon we will reach this number. We have never occupied more, consumed more or build more. It is expected that by the year 2050 almost 70% of the world population, expected to reach 9.15 billion, will be concentrated in the great urban centers. These cities will face a completely unseen pressure in the development of the human civilization and they will represent the main architectural stage for the creativity of our present day students.

The problem that we face right now in the pollution – oriented cities of today lies in the existing mass of buildings that ignored basic ecological requirements. Behind every building lies an architect and that architect may be a good or a poor one, he may have evolved from his school years more or less. It is the responsibility of all architecture universities to think of the resulting mass of architecture generated from the work of their students, those that will rise above the average will do so on their own volition but for the rest it is our responsibility to ensure that the ecological problem and today's solutions are presented so at least we can ensure that during their school years students train their minds around eco-solutions.

Ecology faces a great dispute as it is considered an obstacle to economic growth and a costly undertaking but the truth of the matter is that a well designed building is cost – effective and conceiving an architectural object on the basis of

sustainability and eco-responsibility offer more advantages, not only from an ecological point of view but also the economical one.

The use of materials that require less energy to produce are cheaper, thermal protection of the outside skin of a building means that less energy is required to maintain a suitable internal environment, utilizing alternative energy systems also has the same result. These represent only a fraction from the myriad of solutions that exist nowadays that prove that even if in some cases the initial cost might be higher the end result is much cheaper, so using eco – solutions is an economic, pragmatic approach.

Economics should be an important aspect in the teaching process because immediately after the end of their studies, students are faced with the economic problem of architecture, problem that for the most of them remains a mystery up to the moment they are graduated and face a project in real life. The lack of knowledge in this delicate aspect makes them resort to well established construction techniques and materials that represent the easy way of solving the issue. Unfortunately this model is why we are facing the mass of un-sustainable and ecologically - irresponsible architecture that surrounds our everyday life. Without a minimum understanding of the crucial role of economics and manufacturing costs, the young architects of tomorrow will continue to repeat the same model that has brought us to our present day crisis.

Sometimes the hardest part in introducing en eco-solution is convincing the client of its efficiency, and usually the easiest way to convince is to use “the numbers”, even if those numbers represent costs or diagrams. The teaching process is responsible to offer those numbers to the future architects, to give them all the means possible to be responsible players in the future they build.

Sometimes though numbers are not enough, they “might” not be the highpoint of the day for a student. It is equally important for them to see and understand the bigger picture, the path that all their creations take from **raw materials to finished product**, because only when one understands all the implications of his actions, true responsibility appears.

In the wake of this ecological crisis maybe it’s time to ask ourselves if architectural education shouldn’t also be enriched with the notion of ethics in architecture from an ecological point of view, because right now eco-responsibility flows hand in hand with ethical questions about ones role in society.

3.1 Guidelines

In the time spent in the university every student studies certain aspects of architecture and design, from object design to urban management. From the multitude of possible outcomes and specialties in the field every student will choose his own road. Even if it means working in the detail of a simple object or mastering the vision of a future city, the ideas of sustainability and eco-responsibility should find themselves at the very core of ones creativity; this reflex action is embedded during the years spent in the university.

There are many studies on green architecture, sustainable urbanism and alternative energy sources but unfortunately they are left mostly only in the hands of present day architects while students have only scraps of information. The following list is based on those studies and tries to offer a sketch of how eco-solutions can be implemented in most aspects of architecture and urbanism studies.

Object design

Object design is probably the part of architecture that has the strongest link with the ever-changing nature of fashion. Objects nowadays are imbedded with a mark of status and give a certain fashion statement to the owner. They also try to have a certain adaptable nature to individual tastes and cultural backgrounds but their quality as world wide commodities makes the need to introduce ecology in the design process even more important. The path taken from design process to

finished product generates an entire array of consequences that the designer must take into account. Fashion is an fleeting illusion that changes abruptly but an object is real and tangible and for it's creation materials, energy, money and people are involved and these resources must be used responsibly. Working on the basis of this principle a *design object* must also be enriched with other values besides fashion like multi-functionality, durability, sustainability, energy – efficiency and all those other factors that take into account both client needs and ecological needs:

- Multi-functionality lowers the need for other products and by doing so the overall energy output is lowered.
- Durability is a delicate aspect, for most production companies having a product that breaks down easily is economically efficient but with the rate of population growth that shouldn't be an issue. The designer should take this aspect into consideration otherwise it becomes an accomplice in the depletion of earth resources for the sake of mass-consumption.
- Sustainability is accomplished by a clear understanding of the manufacturing process, the materials used and the minimization of resulting waste. Optimizing this process generates energy efficient solutions for the same product.

Furniture Design

This part of architecture is a mix between the fashion oriented project of the designer and the personality traits of the client. But even if the end result is based on individual taste and fashion it still has to follow the same path of design object. Taking sustainability and ecology in the design work for furniture is a way to subtlety induces eco – responsibility in everyday life-style. Being eco-friendly at an individual level for many it can be difficult if certain conditions don't exist and in these situations the designer can help educate the general public by offering solutions based on the premises of an ecological life-style.

- Furniture must adapt to the clients requirements but it can also be a step ahead in the evolution of individual life-style in accordance to ecological demands. For example it would be much easier to recycle individual waste if kitchen cabinets would have individual slots for selective garbage. Present day garbage units are nothing more than a large bin where everything is in the same place making recycling at an individual level a headache.
- The materials chose for the manufacturing process must also be thought-out following the rules of sustainability and energy-efficiency.

Interior design

Interior design concept follows the same guidelines as those used for object and furniture design. Sustainability, multi –functionality and energy efficiency can be followed so that everyday comforts are not affected but overall lifestyle patterns are changed so that a responsible behavior towards ecology does not become a hindrance but rather a normal element in everyday activities.

Architecture and Project Management

This is probably the widest area of influence that and architect can exercise upon the general public. The habitation machine must be a finely tuned instrument that is just a small part of a much larger mechanism. A responsible approach involves knowledge of all the resources that go into a building and resolving the various conflicting issues and requirements. This type of approach may prove to be a difficult challenge for a student in the first years but as the complexity of the projects grows, so do the demands and responsibility for every decision taken in the design process. The students must be aware that each decision has environmental implications. Various studies in the field of green

architecture revolve around four areas of concern that must be taken into account during the design work:

- reducing energy in use
- minimizing external pollution and environmental damage
- reducing embodied energy and resource depletion
- minimizing internal pollution and damage to health

Following the path of evolution in the field of education in architecture, numerous new concerns are added to the basic building design concerns and they should become part of the teaching process. The ecological requirements for today's and tomorrow's architecture are not an eccentricity left to individual choice but a necessity in the formation of all future architects.

- Reduce human exposure to noxious materials.
- Conserve non-renewable energy and scarce materials.
- Minimize life-cycle ecological impact of energy and materials used.
- Use of alternative energy solutions that are sustainably harvested, their implementation method, schematics and costs
- Energy saving construction methods
- Adaptation of architectural design to local climatic conditions and the use of local construction materials based on their eco-effectiveness
- Use of energy effective materials that are sustainably harvested.
- Analysis of every element of a building and understanding it's relationship with the surrounding environment and the properties of the material it's made of.
- Elimination of waste resulted from the construction process
- Adaptation of the project to the psychological and sociological characteristics of the population residing in the area where it is being built.

- Clear understanding of the path between raw resources and construction material – energy, transportation and use costs.
- Operation and maintenance costs
- Protect and restore local air, water, soils, flora and fauna.

In the organization of any sustainable design, project management plays a crucial role. The capability to puzzle together all the aspects involved in the design process and to understand how well-thought designs avoid inherent flaws can make students realize that the architect only together with the other specialists can manage the complexities of a building process.

It might be considered too early for a student in the second or third year to start receiving notions of project management but in the final years this knowledge will not only help in his collaboration with other fields in real life projects but he will understand how different sciences can provide unique solutions to architecture.

Urbanism

The most difficult challenge in the adaptation of eco-responsibility and sustainability lies in urbanism. The resources, the economic strain and the consequences rise exponentially. If we take into account that 70% of the CO2 emissions are generated by cities the responsibility that falls on the future urban planners is enormous. If the architecture of one building tackles the CO2 footprint of a family or a couple hundred individuals, urbanism has to cope with the resulting waste and CO2 signatures of millions. The city acts as an organism that grows and consumes constantly and in most cases this growth happened without regard to ecological concerns.

The future development of cities will have to rely on organizational methods that will reduce waste of materials and energy, systems that can adapt to a growing population and serve ever-increasing demands. Every city produces millions of tons of waste every day but if proper recycling systems can be introduced during daily activities then the urban CO2 footprint can be reduced substantially. It is almost impossible to reduce the waste produced by a city to 0 but with correct management it can be lowered enough to allow the surrounding environment to regenerate certain resources.

To bring urbanism to respond at the ecological crisis we face, it must be conceived for new mentalities, even if the inhabitants will require more time to adapt themselves to new environmental criteria, future urban planners have to be the ones who take the initiative. This statement is not meant to place urban planners in a god-like position but it comes down to the responsibility they have to offer suitable conditions in the application of eco – solutions:

- Clear understanding of what is an individual CO2 footprint and how it multiplies exponentially in the over-all activities of all the inhabitants of a city.
- The capability of introducing sustainable, eco-pragmatic solutions in the urban design concept.
- Deciphering the future outcomes of an urban intervention in a short – term to medium – term time spam, and the resulting ecological consequences.
- Supporting those urban solutions that require less individual energy consumption in daily activities.
- Support pedestrians, bicycles, mass transit and other alternatives to fossil-fueled vehicles.
- Overlapping the recycling infrastructure on the existing urban layers.

Urban Management

Acting responsibly about architecture and Urbanism is not a gradual process. The problems that we face are here, now and immediate action is required. In this situation the teaching system must be able to provide students with all the information about existing conditions and especially the major flaws on which the development of our cities are based on. Understanding the present day conditions, the factors and the urban behaviors that triggered them can offer a clue as to where the system can be changed so that the adaptation from pollution – oriented to eco – oriented cities happens effectively. Eco – solutions at an urban level should come as a natural movement of social phenomenon and the city inhabitants adapt to them without frustration.

In many cases the integration of ecological thinking in urban management is a matter of understanding the psychological, sociological and historic characteristics of the residing population. Analyzing these factors can offer a clue as to the best approach in which ecology can be introduced at a mass – level so it can be easily accepted. This type of approach will differentiate some of the teaching patterns of each university but the resulting goal is the same. There are various studies on Sustainable Urbanism, so the solutions exist but just like in the case of Sustainable Architecture these solutions are not yet part of the mandatory curriculum of all European universities so the students are have only a limited exposure to this different type of approach.

- Critical view of the root causes of pollution in each individual case – study
- Adaptation of eco-solutions to existing urban tissue.
- Comprehension of the social structure and psychological nature of the residing population.
- Underlining the existing climatic context of the analyzed city, but also taking into account the forecasted climatic modifications.
- Understanding of the future ecological, economical and energy demands of growing city structures.
- Adaptation of a growing population to an existing ever changing urban frame and the consequences of that process.

4. Education and Ecology

There is a saying that "*we are best remembered by the gifts we leave our children* "so what gift could be more precious than that of education. Our capacity to prepare our students for the challenges they are going to face in the near future, to give them the capability to build the future we all dream of.

There should be a concept of sustainability in education, if we try to understand the consequences of our actions when we act our profession maybe we should use the same criteria in the education of our students. Every action taken has consequences, education follows the same rule but in the case of architecture the ecological consequences are far reaching and affect us all in the long run.

Enriching the education process with values like Responsibility, Sustainability and Ethics we ensure that we do our part in saving our environment, and protecting the future of our civilization.

An example of how education can have direct implications in ecology was the program organized in 2004 by EASA (European Architecture Students Assembly) in Aarthus, Denmark. The workshop involved 400 students from 33 countries and the theme was Sustainability in Architecture. The program was divided in multiple workshops that had the same theme but one of them gave students the chance to get involved in a very practical way in the construction of eco-architecture.

Supported by the Danish government a prototype eco – village vas created, based on straw bale house construction methods. The project tried to create a small village with 20 – 25 houses and each of these houses had a fixed budget set to 35.000 euros.

After two weeks and the involvement of more that 200 students several houses were completed and everyone that participated was given a revelation. To watch 200 people from different cultural backgrounds working and applying their knowledge to a common goal was nothing more than a tribute to the power of unity. Everyone gave their unique signature but the end result showed that it was greater than the sum of its parts.

Education unites us all and through it we can change the wrongs of our time and make a difference to our future. We are different but this difference is a source of strength not a reason for division.

"There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction."

- **John F. Kennedy**

Notes
(1) *The 1986 Freon gas restrictions initiative managed to solve the ozone hole problem*

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