

TRAINING UNDERGRADUATE STUDENTS IN EARTH ARCHITECTURE. Teaching traditional building techniques to preserve vernacular heritage.

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Vernacular built heritage and earthen construction is subject to be valued and learned at schools of architecture nowadays

Teaching how to build and repair earthen constructions is a subject of main importance to be included within the Plan of Study of nowadays universities. It is, on the one hand, an alternative for sustainable design, and on the other, the means for recovering the irreplaceable vernacular built heritage that conforms a significant amount of landscape in Mexico.

The Faculty of Architecture in the National University of Mexico comprehends exclusively teaching how to build and design with concrete and steel. Therefore, including alternative sustainable technologies within which earthen architecture is fundamental constitutes a necessity to offer actualized teaching methods in architecture.

The purpose is to stroke a bridge between education and practice

A learning method based upon an ethic attitude towards the natural environment and value traditional architecture as an important cultural heritage asset allows students to deal with problems beyond the scope of architecture.

In general, professional architects lack training and knowledge on how to design, build and repair adobe buildings. And even monumental works are usually repaired with concrete exclusively. It is therefore our responsibility as professors to widen up the possibilities among which students can make the right choice and have the elements and training to manage it according to each case. Therefore, teaching students how to build, maintain, adapt and restore adobe architecture complements and enriches their university education and widens their professional field work.

Learning craftsmanship from the people that build their houses without architects

And by learned knowledge I refer on the one hand, to the academic, scientific and systematized knowledge as well as in this case, the one acquired from learning the traditional building methods from the people at the rural communities.

The knowledge generated within rural communities, the one transferred from one generation to another, carries a substantial amount of knowledge related to building aspects. With this training approach students are expected to be qualified enough to carry out proposals corresponding to a wider range of cultural environments.

People from rural communities possess this knowledge in a simple and intuitive wise way such as the use of solar passive energy or the criteria of bioenergetics field that popular wisdom has developed along generations. Such empiric knowledge needs to be assembled, organized and adapted to the academic level. It is subject to be systematized and classified and once processed, complemented and proved it will certainly enrich the training of architecture and at the same time it will become possible to transmit it to the inhabitants of the rural areas as concrete projects that may improve living conditions and make them value their traditional architecture and craftsmanship.

In spite of...students are eager to learn about alternative materials and technologies

Now, in Mexico vernacular architecture is far from being considered cultural heritage; there are no laws nor governmental policies oriented to preserve this important cultural asset. This contributes substantially to bear such a negative attitude and resistance from the academic community to accept it as part of our plan of studies, to consider it worth its study, its teaching. It is a complex reality since people at the country side dislike it as well, as they related it with poverty. Nevertheless, students are keenly interested in these alternative teaching technologies and look very forward to have an opportunity to experiment it on the field work.

Why is earthen architecture a heritage worth preserving?

In numerous areas of Mexico one can find good quality of soils for building, earthen building tradition that persists or has existed is a valuable sign. There is a high percentage of soil in the vegetal layer of earth, among which some are more susceptible to use for building purposes than others but even poor soils allow improvement after minor modifications are carried out.

Adobe is undoubtedly an appropriate option to reconstruct natural disaster sites.

The lack of credibility on the mechanic efficiency of earth as a building material leads people to opt for concrete blocks and concrete structures. This is especially true because most modern houses with earth walls cannot withstand earthquakes (Gernot Minke, 'Building with Earth'). This fact is reinforced by the badly oriented political policies that allow the introduction in large scale, of cement enterprises whose products are substituting in high speed traditional building materials and systems, damaging the quality of life of the people and tearing down a huge amount of built heritage. Nevertheless, after various earthquakes in Central America, Dr Minke carried on a census that tells us that adobe houses were not worse affected than other kind of structures. There is also evidence that historical earth buildings situated in seismic zones have resisted severe earthquakes through centuries even sometimes.

The course comprehends a graphic explanation of the way adobe structures behave; how the earthen blocks, together with the rest of the elements that form the structure create a mechanic ductile system, that is that the assembling of all the elements with individual mechanic behaviors (the lightweight roofs and the intermediate wooden floors) at the moment of working together, function as a unity capable of resisting efficiently the movements towards the ones it is exposed.

Practice at workshop comprehends:

- Analysis, design and construction of structural earth walls
- Analysis of soils
- Process of manufacture of earthen blocks
- Process of construction
- Solution of building details
- Seismic behavior
- Technical mistakes and failures
- Control and survey of the building site

Students are encouraged to analyze earthen blocks in comparison with cement blocks according to the next conditions:

- Thermal properties
- Energy consumption
- Manufacture costs
- Transportation costs
- Esthetics

Possibilities and design restrictions

- Common building mistakes
 - How to ensure structural stability
 - How to prevent erosion from humidity
 - Repair of damages: valuation of type of damages, diagnosis of structural elements in walls, roofs, intermediate floors, stairs, balconies, lintels, enclosures, repair of wooden structures and tile roofs
 - Alternative building methods: substitution of wooden structure by steel or concrete beams. In which cases it is advisable to do it.
 - Traditional finishes. Limestone and clay plaster
 - Maintenance of adobe walls
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Abstract: The project is focused on training undergraduate students on how to build raw earth architecture, with a thorough understanding and solid practice that can lead them to offer adequate solutions based on appropriate technology both for rural communities as well as for urban outskirts and historic centers in Mexico, particularly those where earth building tradition persists. Solutions that may maintain the balance of the natural environment allow self-building prototypes and consider local ways of life. Methods on how to teach students to self-learning have to be based upon both theoretical as well as on practical learning experiences.

Nowadays, schools and faculties of architecture are expected to widen their alternatives regarding building, design and restoration solutions through including craftsmanship techniques which in the other hand, most of the time are naturally based on sustainable building technologies. The proposal considers a theoretical basis, workshops, fieldwork and design exercises for rural communities that have a valuable vernacular building heritage to preserve and local natural environments. Manufacture of didactic material such as articles, books and manuals is as well considered. The project includes the infrastructure needed to carry out these particular learning needs.

Keywords: Raw earth, rural communities, adobe architecture, architectonic design, environmental design,

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