

EDUCATIONAL INNOVATION PROJECT AT UPV (SPAIN): “WITH YOUR HANDS. EARTH AS A MATERIAL FOR DEVELOPING CREATIVE AND CONSTRUCTIVE SKILLS”

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Abstract

This text presents a project for educational innovation and improvement in the field of architectural restoration carried out at the School of Architecture of Universitat Politècnica de València (UPV, Spain). The project was carried out in the 2016-2017 academic year.

The Iberian Peninsula is a territory that is extremely rich in earthen architecture, both monumental and non monumental. The size of the territory and its heterogeneous geography and climate, its cultural diversity and the different materials available are the main factors which generated a wide range of earthen construction techniques throughout history (rammed earth, adobe, half-timber, cob and its variants). This heritage is a major part of the local culture both because of its remote origins and the varied technology adapted to natural and cultural surroundings. In addition, given its salubriousness and its cultural relationship with the habitat, earthen architecture is currently an interesting line in the construction of new architecture as earth is the most sustainable material, providing energy saving throughout the entire construction process. However, this material is barely studied at university, and newly qualified architects have very little training in this field.

The main aim of this project was to bring earthen architecture closer to students in practical terms through active learning methods. The aim of this project for educational innovation and improvement is to introduce earth experimentally as a construction material in three subjects at the School of Architecture (Architectural restoration, a compulsory subject in fifth year; Composition, a compulsory subject in fourth year; and Restoration of non monumental historic architecture, an elective subject from the Master's in Architecture) through group and individual activities aimed at students taking part. These activities were proposed with a “learning by doing” methodology so that students could learn about the material while working and experimenting with it.]

Keywords: Innovation, educational project, earth architecture.

1 INTRODUCTION

Iberian Peninsula is a territory that is extremely rich in earthen architecture, both monumental and non monumental. The size of the territory and its heterogeneous geography and climate, its cultural diversity and the different materials available are the main factors which generated a wide range of earthen construction techniques throughout history (rammed earth, adobe, half-timber, cob and its variants). This heritage is a major part of the local culture both because of its remote origins and the varied technology adapted to natural and cultural surroundings. In addition, given its salubriousness and its cultural relationship with the habitat, earthen architecture is currently an interesting line in the construction of new architecture as earth is the most sustainable material, providing energy saving throughout the entire construction process. However, this material is barely studied at university, and newly qualified architects have very little training in this field [1].

The aim of this project for educational innovation and improvement is to introduce earth experimentally as a construction material in three subjects at the School of Architecture (Architectural restoration, a compulsory subject in fifth year; Composition, a compulsory subject in fourth year; and Restoration of non monumental historic architecture, an elective subject from the Master's in Architecture) through group and individual activities aimed at students taking part. These activities were proposed with a “learning by doing” [2] methodology so that students could learn about the material while working and experimenting with it.

2 AIMS OF THE PROJECT

The aim of this project is to provide more in-depth learning about earthen architecture to students, so that they can understand its importance in local heritage as well as its potential in the design of a more sustainable architecture. The main aim is therefore learning about earth as a construction material and the endless creative possibilities of its application [3].

Students should be able to touch the earthen material “with their hands” (Fig. 1), building following traditional techniques and experimenting with creations so that they can learn about this material as part of a constructive tradition that should be known, valued, and respected. In addition to being a valid tool and a current material for contemporary designs, it also provides aesthetic resources and major advantages in terms of energy saving, salubrity, ease of execution, etc.



Fig. 1. Left: Image of students experimenting the earth with their hands. Right: Image of material preparation.

The main basic objectives of this project are:

- 1 The promotion of increased awareness of earth as a material: by observing and handling earth students can learn about its general characteristics and properties as a constructive material and learn to identify different types. Experimentation with different simple field methods on the different properties (plasticity, humidity...) of earth.
- 2 Understanding traditional techniques: the execution of traditional earthen architecture techniques (adobe, rammed earth, cob, half-timber) is used to learn about how tools were used, and the phases of execution, drying and implementation. The students learn to understand and value the constructive techniques and the traditional buildings executed through experiments, using these to understand the importance of conservation and restoration.
- 3 Encouraging the creation of experiments with earth. Based on knowledge of earth as a material and of constructive techniques students can use their hands creatively to find forms of expression and innovation derived from the material and apply these to their study or design

3 LEARNING ACTIVITIES AND TASKS CARRIED OUT

In order to attain the three main objectives stated above there was a one-day workshop within the framework of the three subjects covered in the project and shared by all three subjects, which meant that students could work together.

Not all students of the different subjects took part in this activity. Instead, at the start of the academic year a pilot group of volunteers (80 students) agreed to take part in this experimental activity. The workshop took place on the UPV campus, on the 8H site used by the team for educational activities (Fig. 2).



Fig. 2. Image of volunteer students participating in the workshop.

The specific learning acquired on this day was then applied to the subjects' curriculum in the form of practical exercises. Students were offered the chance to take part in this experimental activity, and the volunteers who decided to participate chose a practical case study relating to earthen architecture.

The tasks carried out for this project were as follows:

- 1 Specific adaptation of practical activities for an experimental group in each subject. Specific themes were sought so that students could apply the practical knowledge acquired to the experimental activity: buildings constructed with earthen techniques to study and execute a restoration project for the subjects of Architectural Restoration and Restoration of non-monumental architecture. This knowledge is also relevant to analysis and design of contemporary earthen architecture for the subject of Architectural Composition.
- 2 Setting up the experimental group: 25-30 volunteer students were selected to take part in the activity.
- 3 Design and organisation of the specific "WITH YOUR HANDS" workshop: numerous activities relating to earth as a construction material were designed: handling and characteristics of earth; construction of adobe, rammed earth, cob and half-timber; creative experimentation with earth.
- 4 Development of the "WITH YOUR HANDS" workshop: a pilot group of students from three subjects took part in the workshop and all the planned activities.
- 5 For the workshop, students from different subjects were also grouped together to encourage peer learning [4]. Four simultaneous workshops were scheduled to work with smaller groups, rotating so that all groups could take part in all workshops. The main aim of these workshops was to ensure learning through direct experimentation with the material and construction (Figs. 3-5).
- 6 Putting the knowledge acquired in the workshops into practice in the subjects: participating students applied what they had learned to the practical exercises to be completed throughout the academic year for all three subjects.
- 7 A one-day presentation of the work carried out: at the end of the programme for individual subjects and following completion of the tasks a common presentation was organised, and students take part explaining their work and experiences to the rest of their classmates, also debating whether this new methodology is helpful to their learning, and so, to the development of the subject.
- 8 Assessment of the results obtained: once the teaching-learning process was completed a specific survey was carried out among students to assess their motivation and satisfaction with the activity carried out, as well as to find out whether or not it was positive in the improvement of learning.



Fig. 3. Left: Workshop of handling and characteristics of earth. Right: Finishing workshop.



Fig. 4. Adobe workshop.



Fig. 5. Rammed earth workshop.

4 ASSESSMENT AND DISSEMINATION OF RESULTS

Once the phases for the preparation and execution of teaching innovation activities of the project were completed, they had to be assessed [5]. The results (positive and/or improvable) of the project were assessed thanks to surveys among students (both volunteer participants and non-participants in the project) which were subsequently analysed to extract conclusions.

The surveys were drawn up using Google Forms for ease of use and management of data obtained. Moreover, the fact that the surveys were generated virtually made it easier to obtain the necessary feedback from students, and 139 responses from students (64 from participating students and 75 from non-participating students) were collected.

This survey focused on two major themes and was divided into two blocks of questions, one relating to students' individual personal experience in the workshop (experience obtained if they took part or reasons for not taking part), and another focusing on matters relating to earthen architecture. The results, both for students taking part in the workshop and for those not participating, were compared to ascertain the actual improvement stemming from this direct immersion in the material.

Surveys were also completed by the teachers taking part in the project to assess general satisfaction and the level of motivation reached, in order to evaluate the possible implementation of the project methodology and its adaptation to the students of these subjects and perhaps to students in other subjects in the Higher Technical School of Architecture (for example, the Department of Architectural Composition).

Several actions took place promoting the results of the project for educational innovation and improvement and students held a presentation showcasing the results of the final work. The students from the pilot group presented the work completed in the project to their classmates, explaining their experience.

5 CONCLUSION

This project in educational innovation and improvement has made it possible to introduce earthen architecture to architecture students directly and experimentally. The importance of this type of learning initiative based on active methodology [6] is becoming increasingly clear, as is the demand of university students, who are usually accustomed to a type of learning based on master classes where they are merely spectators, and they are hugely enthusiastic towards these new forms of learning where they are the protagonists of their own learning [7].

In addition, direct experience with the material has provided students with far greater knowledge than would have been achieved in a classroom. Therefore it is important to highlight the importance of this type of innovation action, with learning methodologies based on direct experience and activity participation, on “learning by doing”, increasingly present in university teaching.

NOTE

This text is part of the Project in educational innovation and improvement “WITH YOUR HANDS. Earth as a material for developing creative and constructive skills” (“CON LAS MANOS. *La tierra como material para el desarrollo de las capacidades creativas y constructivas*”) (code A06, 2016-2017 academic year, main teacher: Camilla Mileto), funded by the Vice-Rectorate for Studies, Quality and Accreditation of Universitat Politècnica de València.

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