

Work Sites as a Halfway through Teaching and Research

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Abstract - In the Higher Technical School of Building Management at the Polytechnic University of Valencia, different experiences have been carried out leading to architectural heritage research. Students interested in historical buildings restoration have taken part in them. The different experiences of work sites have shown really satisfactory results achieving the proposed goals, i.e. to qualify the student in the development of the necessary studies for the intervention in a building with high hereditary value putting into practice the acquired knowledge and background from the different subjects involved, to make the student sensitive in those topics related to historical heritage preservation and integrate him/her in participative formula based upon team-work. In this paper we will tackle with the methodology established in the different experiences, in which teaching and professional practice have been combined by means of testing on real samples.

Index Terms – Work sites, Historical Buildings Restoration, Teaching Methodology.

INTRODUCTION

When we begin to work as professors we will soon verify the difference that exists between knowing and teaching. It is totally impossible to be able to transmit our own skills and knowledge to the students if we have not been able to motivate them in this sense before. We will obtain very poor results in our task as teachers if we cannot manage to raise in the student the desire to learn. We can assure that the pedagogical capacity of the professor is essential to obtain a good transmission with the students.

Making history we can observe the evolution of the learning and transmission of knowledge to the initiates in the difficult task of becoming technicians of the constructive process. Before the existence of the professors, they were defined as professionals of education, the recognition of the paper exerted by the teachers has made possible the learning of the jobs related to the construction. The teacher taught his job through the constant practice, the experience, exerting his

influence on the students because with it he was able suggestively to captivate the disciples. At the present time, very few professors are able to be true teachers, as well as on the contrary the great majority of the teachers never have exerted like professors. The method of education through the practice used by the teachers had excellent results since if it is possible to learn a job, the learning is made by exerting it. Nevertheless, the results of this training will depend of the success in the election of the methodology and, more widely, on the suitability of the educational strategy. In order to develop a suitable methodology it is previously necessary to analyse a series of factors that will influence remarkably in the development of the strategy:

How can we make the students understand and adopt the “correct attitude” that will enable them to accomplish good works? Is it necessary to aspire to high levels in the education of disciplines in which it would perhaps be enough simply obtaining correct levels of accomplishment? As human beings we have an insatiable eagerness to learn, and the perspective of new knowledge and experiences is pleasant to us. Weariness comes later invariably, when the student understands that the School does not offer anything at the level of his expectations. If education is routine and it is limited to the learning of “techniques”, soon the difficulties overcome the less motivated students, who are an important rate, and the generalized downhearted leads to results below correct levels of accomplishment. Impersonal education causes in the student a sensation of abandonment by the professor in those first steps which must be crossed with their aid.

On the other hand we were with the lack of unit in the programs that are distributed in the different Schools. The content of the courses is different, changing in each university. Even at the same School we could find colleagues who make courses with the same name but with different programs.

We see that words like “weariness”, “downhearted”, “abandonment”, and “not coordination” sound frequently into the university. At the moment we are experimenting varied educational experiences. In this communication we will be centred in one in particular: The work on sites

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directed to the recovery of the architectonic heritage.

The restoration of the artistic-architectonic heritage is one of the professional specialities with greater amplitude at the present time. The technicians need to be familiarized with the subjects related to the intervention in historical buildings and that supposes to have received a formation that enables them to carry out these works using the appropriate methodology in each case.

PEDAGOGICAL IMPLICATIONS OF THE WORK SITES

Motivation is one of the most important factors to determine learning. For that reason, to facilitate the students' interest and to get them make an effort to understand and to learn, diverse investigators have studied the factors on which such motivation depends and have developed models to create learning surroundings. These models can facilitate a suitable motivation [1].

The clearest meaning of "the work sites" is instruments. We look for to learn something useful, that is to say, something that makes possible to increase the students' capacities, obtaining more competent students and at the same time making them enjoy the process, if its utility of to learn is not perceived, the interest and the effort tends to diminish when the students consider the question of this utility. We can affirm that the students work intrinsically motivated, being able to remain in their work, surpassing the increased boredom and the anxiety, reaching the control in their process of learning and considering it as the profit of a personal project.

The academic activity is not made in an impersonal form, but in a social context in which the relations between professors and students affect the degree of personal acceptance in a positive way since we understand that every student aims to feel accepted.

The fact that of asking the students for the accomplishment of practical works outside the context of the classroom, facilitating the understanding of the contents that are to be learned, help the learning and increase the motivation of the students. The students positively value the variable of the motivation to learn because the own professors pay attention to the students outside the classroom helping them to surpass their difficulties [2].

OBJECTIVE

The work sites are a fast and effective form for the student to make a professional labour relative to the previous studies of a historical building. They are the perfect educational instrument to mix the theoretical contents with the professional practice under the frame of the architectural heritage investigation.

The objective of this experience is, first at all, to guide the students by means of the observation of an image that they transform using the graphical language, taking into account a previous study of its expressive functionality by means of comparison and analysis of diverse images. Thus, the type of

learning and strategies followed are rather based on procedural and technical methods.

We give the student a wide vision of the methods and existing techniques for the intervention in historical buildings using real models. The pedagogical experience is complete because the student works in a real problem that must be undertaken from a professional point of view, obtaining the proposed objective the student is sensitized with the subjects related to the preservation of the architectonic heritage. Finally, the work sites is a way to collaborate where the obtained result is fruit of the group work

All this allows the student receive information varied but supported by thought structures, and strategies that are confirming or forming him like a professional who will tend to behave according to the before mentioned educational objective.

The new experience, therefore, has two dimensions: to obtain the objectives of learning and the means integrated in education. Between these objectives is the learning of the knowledge necessary to express, to understand and to assimilate the architecture graphically. This implies to solve the problem of the objective reading from the form, that is to say, the reflective and meticulous analysis of the model, which entails the analysis of the used constructive systems and constructive techniques in the building process.

In the present communication the methodology followed in the different experiences will be approached, where we had mixed the educational work with the professional practice on historical buildings. The results and the work of coordination exerted by the professor will be exposed. We will analyze the advantages that this educational method contains and finally we will conclude with the characteristics and the requirements that a work site must have so that the results, both educational and research are satisfactory.

METHODOLOGY USED IN THE WORK SITES

In this section we will also show not only the development of the experience but the considered parameters to make possible this pedagogical strategy that has been totally satisfactory. In fact, the main objective is to transmit the students enough motivation and knowledge to be good professionals in the future. The students will be forced to understand that the good development of their work is based on a decision-making process.

First of all we propose the students a real problem that must be undertaken from a professional point of view, using the knowledge and instruments that they have to reach the objective. This objective consists on the drawing of the plans of a building with a historical value and the study of the systems and constructive techniques developed in its construction.

In the elaboration of these works the students learn to dominate the expressivity of the instruments used on the different supports. They must be conscious of the used graphical operations and their plastic quality. In the same

way they learn to analyze the form, which is the only option that can guarantee the repetition of an architectonic impression, in the same way that we could reproduce a physical phenomenon in a laboratory. They learn to differentiate the constructive techniques used in the creation of a historical building and to represent them graphically. They also learn to analyze the constructive systems used and to deduce the reason for their use. As you can see it is a work with objectives that includes experiences related to the area of graphical expression, construction and architectonic structures, so it is a multidisciplinary task.

Architectural drawings and graphical representation are considered like an exercise, where the capacity of representation of the student is valued, because along with the normal ability, the theoretical and conceptual knowledge are necessary, to allow the graphical representation of the building. We persecute the education and learning of the architectonic graphical representation; but beyond the simple work of measurement and representation of a building or a urban area we are interested in its character of critical reading, in which the architectonic graphical information is understood like a work of analysis, selection and synthesis of the reality. It means the analysis and consequently the deep knowledge of the intervening structures in the construction of the building. On the other hand one of the main purposes is to sensitize the students with the subjects related to the preservation of the architectural heritage.

In the pedagogical experiences proposed the students start taking the data of the building in a work team, being supported by the professor. Works are focused like a "factory" or "work site" where the taking of data is made jointly (students and professor), looking for shared formulas and where the result obtained during the intensive work time is the expected of a professional work. The figure of the professor is like the coordinator of works that must be made by technicians (who are the students) in a limited time period.

We could argue that in this way the acquisition of consistencies - in a pedagogical meaning - is obtained in a short-term period.

In architecture a graphical representation becomes a research work and in addition to the intrinsic qualities that all rigorous study must have, it must contain a quality that turns it inestimable: it must be useful. The student must understand, through the experience, that the graphical analysis that is made of an architectonic object must have this characteristic and at any moment it must guide our intention. For that reason, we must encourage the students, as a primary necessity, to work in a rigorous way with the geometry and the metric of the studied buildings, allowing, with the elaborated graphical documentation, a parallel reading of the building to which it is important the images contribution that testify the investigations carried out.

As in all investigations, it is necessary before beginning the graphical works to establish a logical methodology for the attainment of the proposed aims. It is not possible to understand the graphical analysis of a building like the accomplishment of sketches with measures that will be used

to draw plans on scale. The student will be forced to understand that the graphical analysis for the previous study of a building is much more than that, since through the drawings we can settle the life and history of the building, its vicissitudes, their interventions and their demolitions. As the students are drawing, they are catching the space in the paper and reflecting its space organization and the laws that govern it. Also they will get to know the composition morphology of its facades. Through the drawings that the students are making with the aid of the professors they will be getting to know the systems that sustain it, the materials that compose it and the constructive pathologies that affect it. The students will finish being able to transfer, not only the building in itself, but also the perception that produces to them, to graphical representations, through which we will check that they understand all the mysteries that surround the represented architectonic work. Following the words of Mario Docci... to really know and to understand an architectonic organism, it is necessary "to raise it", that is to say, to do it and to reconstitute it through representative models graphically [3].

All this implies a work process that will be different in each case. Nevertheless, we can establish a series of basis that serve as an scaffolding to the architectural graphical representation.

We will begin investigating on the historical antecedents relative to the constructive evolution of the building and compiling that graphical documentation that had been conserved, or that it had been elaborated recently to transfer it to the students before beginning in the work site. Also a conference made by a recognized professional expert in rehabilitation subjects is organized making the students, know in advance the building they are going to analyse and the works that they will have to make.

Later, we will move to the place where the "work site" is. Once there, it will be the very architecture the one that will tell us about its history, its conservation, its modifications, its different uses throughout the years, its extensions, its reforms, its adjustments to the different stylistic fashions... To make all this dialogue take place, it is necessary that the student becomes implicated in the works. It begins making a rigorous graphical analyse that includes the total knowledge of the building and its constructive systems. The study of the space is made initially in a global form, trying to shape the space organization of the building in few sketches of general views that define geometry and the generic metric relations that the architectonic work locks up. The general plants and the vertical sections will give us the clue on the indications that concern the proportion laws that the building locks up. This part of the work is undertaken by the professors since the student "usually loses himself" in the great dimensions. The students' work will initially consist on the elaboration of the sketches of the different areas or zones in which it is possible to divide the building. Small spaces are easier to analyse by the students. In this phase they study the geometry deeply, as well as the metric proportions arriving at the level of necessary detail for the complete definition of each one from the elements that compose this architecture.

Finally the systems and constructive techniques through the drawings of details are analysed.

All these data collected “in situ” are digitized daily, so that the work day is divided into two phases: the stage of taking data and the stage in which all the data collected are introduced in the computer to obtain plans on scale. This procedure makes possible to detect errors or omissions simultaneously with the development of the work.

The experience is very satisfactory and has a great educational wealth and results. The obtained drawings are exposed later, not only at the School but also in offered places by other organisms, which mainly motivate the students to obtain brilliant results.

EDUCATIONAL EXPERIENCES

These premises, that can be labeled as theoretical and little reasonable at the time of being used, have been put into practice in the Higher Technical School of Building Management of the Polytechnic University of Valencia in diverse pedagogical experiences directed to the research of the architectonic heritage. These experiences have obtained a wide repercussion, both in the educational scope and in the social surroundings. These have been developed in collaboration with the organization Forum UNESCO. This organism was created to make specific activities relative to the protection and safeguard of the cultural heritage, mobilizing the international university community [4].

In this sense, we were working in two religious buildings of the Company of Jesus (Fig. 1) : The church of the Sacred Heart with the house annexed and the Chapel dedicated to San Jose, pertaining to the school that the Company of Jesus constructed in 1880. This work was included into the project of investigation proposed by Forum UNESCO on the religious architecture in the city of Valencia. Exhibitions were made in the church of the Sacred Heart of Jesus in Valencia and in the church of San Jose in Valencia as well as in the Javeriana University of Bogota and the Faculty of Architecture Design and Urbanism of Buenos Aires. 20 students, 2 professors of architectonic graphical expression and 2 of architectonic constructions took part. This work lasted for six months.

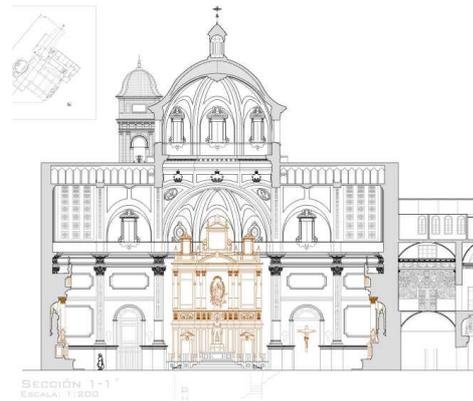
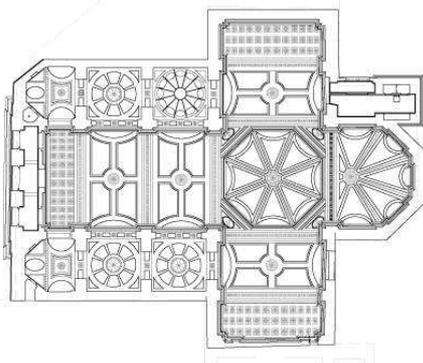
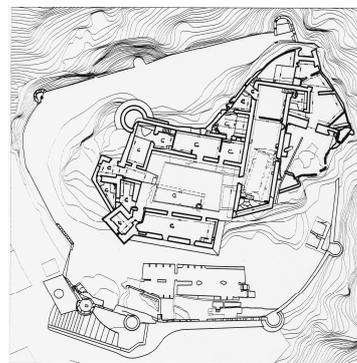


FIGURE 1. CHURCH OF THE COMPANY OF JESUS IN VALENCIA

Also a work site was made to investigate the used materials in the construction of the Castle of Cofrentes (1999) (Fig. 2). This research project has its origin in the preoccupation and the great sensitivity that the City council showed of its recovery , so forgotten during years and that nevertheless, continued being emblematic. 13 students, 2 professors of graphical expression, 1 of topography and 1 of architectonic constructions took part. The taking of data “in situ” lasted for 18 days, although the digitalization of plans extended during 3 months. The results were published and exhibited at the City Council building.



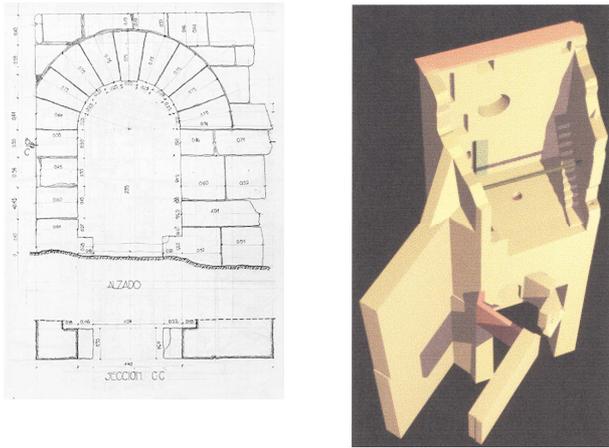


FIGURE 2. CASTLE OF COFRENTES

The enigmatic church of San Miguel de Foces (Fig.3) in Ibieca (Huesca) is another of the studied monuments (2005) and the results obtained have made it possible to publish the book “the Church of San Miguel de Foces: History and Architecture”. In this work participated 17 students, 3 professors of architectonic graphical expression and 2 of architectonic construction. It lasted for 10 days, although the works of digitalization of plans extended during 4 months.



FIGURE 3. WORKS AT THE CHURCH OF SAN MIGUEL DE FOCES

The small funeral chapel in the medieval cemetery of San Juan of the Hospital in Valencia is another of the buildings that have been analyzed by professors and students in a work site (2001). This work comprises the research project for the recovery of the South patio of the church of San Juan of the Hospital in Valencia (Fig. 4). In this work participated 25 students and 2 professors of graphical expression.

These are some examples of the work that have been carried out and whose accomplishment has supposed a widely satisfactory an educational experience, both for the learning and motivation of the students as well as for the

consolidation like “teacher of jobs” of the professors.



FIGURE 4. WORKS AT THE FUNERAL CHAPEL OF THE MEDIEVAL CEMETERY OF SAN JUAN OF THE HOSPITAL IN VALENCIA

CONCLUSIONS

With this work diverse objectives have been obtained helping conservation of the architectural heritage:

- The students, as future professionals, have been prepared in the area of graphical expression working in rehabilitation projects or consolidation of historical buildings.
- The form of work coordinated between professors of structures, construction and drawing allows the students to be able to understand the constructive process of an historical building, where all the aspects that compose it are bounded to each other.
- The student has felt sensitized towards the architectural heritage of his city through monument analysis.
- Finally, and perhaps most important, a magnificent building included in the patrimony of the city has resurged of the forgetfulness

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