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**A LEARNING
EXPERIENCE IN AN
ARCHITECTURAL
MASTER'S DEGREE
BASED ON A PROJECT
AT THE SERVICE OF THE
COMMUNITY**

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Abstract: This learning experience was developed in a spring semester course during the 2020-21 academic year, within the framework of a postgraduate program in architecture. The concurrence of various opportunities facilitated the unleashing of a training process that simultaneously incorporated aspects of the AyS (learning and service), AV (virtual classroom), AC (collaborative learning) and PBL (project-based learning) methodologies. The case study was to redesign the hall of an academic institution of the university itself and the premise of the commission was to recreate an identity and exhibition space in the educational building itself. The experience did not arise, therefore, from a prior conscious reflective process, but rather from the result of a timely demand that allowed linking innovative didactic aspects that had already been partially experienced previously. This experience has been developed in an exceptional context caused by COVID19, but it has potentially scalable aspects to be repeated in other less unique circumstances.

Keywords: Master studies, service learning, collaborative learning, virtual classroom, project-based learning.

BACKGROUND

When, after the so-called Bologna process, higher studies in Architecture were ordered in Europe in an initial training Degree and a subsequent Postgraduate qualification for the practice of the profession, the legislator established different competencies for each of these training stages, aspect which demanded a double effort from Postgraduate university teachers: to teach advanced content but with methodologies more focused on the transition from the student profile to the professional profile (BOE, 2007).

Currently, higher education in architecture is characterized by:

- a relentless growth in the volume of

content to be delivered,

- the globalization of points of view and
- The intellectual difficulty of integrating in a single professional all the skills and competencies necessary for the production of architecture.

Higher education as a whole in the Western social context has been enriched in recent decades with the incorporation of many new pedagogical tools that mobilize still little-explored aspects of the human learning process, such as emotions, collaboration, contrast with reality, etc.

One of these tools, the Service Learning (SL) methodology, considers that asking students to solve a real case incorporating all those characteristics of reality, which are not usually present in conventional teaching, is a great training opportunity. especially in the Postgraduate period when the student is closer to his labor insertion.

The common objective of SL and other recent methodologies is not only to make the learning process more bearable and fruitful, but also to approach the dynamics of professional practice. The challenge that is undertaken in this experience is to bring together various learning methodologies, in a short period of time and for students previously unknown to each other. It is therefore a matter of collecting the potentialities, limitations and incompatibilities of these tools applied in this experience.

STATE OF KNOWLEDGE

(Muir & Rance, 1995) consider that given the changes that are taking place in the construction industry, both in the public and private sectors, it is also necessary to implement changes in higher education in all professions that are common to the built environment, such as architecture.

(Vila i Garriga, 2020) disclosed the

application in architecture training of Service Learning (SL) as an opportunity to incorporate those educational aspects that conventional training lacks in the classroom. (Espinosa Pérez, 2017) highlights "...its interest in applying it as a design tactic, both because of the challenge that dealing with the complexity of reality represents and because of the stimulus that the dissemination and materialization of their proposals beyond the classroom supposes for students."

In university studies, the occasions in which students choose the subject or their professors are limited, and also vice versa. This means that the cohesion and motivation of the students is built progressively in each successive session of the course. The fact of the initial possibility of participating collectively in the resolution of a shared project seems to reinforce the common interest and cohesion of students and teachers from the outset, and that the results at the didactic level could potentially be more fruitful. From this inspiration, the model called Project Based Learning (PBL) is developed, which involves the student in the practical resolution of a complex problem, through which he fully develops his abilities, skills, attitudes and values. For architecture studios, project-based learning (PBL) is not strictly a novelty because for some time future architects have been trained in a dual way, on the one hand acquiring advanced specialized knowledge related to the discipline in thematic subjects and on the other part exercising the practical application of this knowledge in specific cases raised in common workshops called projects. (Canovas Alcaraz, 2019) points out that *"in the PBL the traditional academic problem is transcended because the non-existence of a single valid answer is presumed, but rather it incorporates more complex circumstances such as validation by the client, being subject to an opening date or to a place of execution, aspects that mobilize*

in the student their own skills of diagnosis, coordination, logistics, search and selection of resources, negotiation, public exposure, etc., all of them underdeveloped in conventional learning". (Azorín Abellán, 2018) states that when developing PBL activities, various types of interaction can occur: competitive, individualistic, collaborative and cooperative; In this last "its members work together willingly, use different techniques and group dynamics, share a common goal, understand that their performance depends on collective effort, promote the good performance of others and provide mutual support, which motivates them". When the specific case raised in the PBL acquires a certain complexity, its resolution necessarily requires the congregation of various skills, abilities and knowledge to obtain richer and more consistent results in an efficient way. This is not achieved simply because the activities are divided and assigned to the participants, but when active dialogues are established between the participants, in which ideas and information are shared.

(Johnson, D.W. and Johnson, R.T. 2014) consider the *Cooperative Learning (CL) "as a methodological tool capable of responding to the different needs presented by individuals in the 21st century". (Rodríguez Sánchez, 2015) for his part, considers that the CL "encourages collaboration between individuals, who recognize each other as different and complementary, to learn, share, and expand the vision that each one has on a proposed topic, prior to the establishment of consensus.. For this, the key elements are: clear perception of positive interdependence, group interaction and responsibility, individual responsibility, social skills and group self-evaluation process (Johnson, D.W. and Johnson, R.T. 1990). The collaborative learning model requires the teacher to encourage students to discover and feel satisfied by the accumulated knowledge. (Smith and MacGregor, 1992) consider that:*

“Collaborative learning represents a significant change away from the typical model focused on teachers or their classes in university classrooms. In collaborative classrooms, the reading/listening/note-taking process may not disappear completely, but it coexists with other processes that are based on discussion among students and active work with the course material. Faculty using collaborative learning approaches tend to think of themselves less as expert transmitters of knowledge to students and more as expert designers of intellectual experiences for students, as assistants in a more emergent learning process.

(Cánovas Alcaraz, A. Feliz Ricoy, S., Martín Taibo, L., 2019) consider that *“... The transversal competences that arise in collaborative learning for its development are: ability to function in co-production and co-creation processes; leadership; ability to be actively involved in training; development of social skills; ability to contact and network with experts and real organizations (networking); ability to organize and plan; ability to communicate an architecture and design project to society; ability to devise practical solutions in assembly processes; ability to acquire a certain role in the course; acquisition capacity of new production processes; and critical capacity.*

(Prenski, 2010) has described the current situation of teaching, identifying new ICT technologies as catalysts for generational change. He also believes that this same digital technology that has caused the changes in our students will also provide the tools to finally implement new, more effective and real ways of learning. Although the recent generation of digital VC tools are more oriented towards more active, shared and self-regulated learning, their results seem to depend to a large extent on all students having similar skills, digital media and learning speeds.

DESCRIPTION AND DEVELOPMENT

In the 2020-21 academic year, the confinement due to the SARS-COVID-19 pandemic offered a moment of reflection on the physical teaching spaces themselves. The CITM, Center for Image and Multimedia Technology, a superior training entity attached to the UPC, <https://www.citm.upc.edu/esp/>, proposed to convert the space of its hall, until then a simple place of passage in the TR12 building of the Terrassa Campus (Vallès Occidental, Barcelona, Catalonia, Spain), in an *Ágora*: a small-format meeting point that would enable the activation and exploration of new teaching methodologies, as well as the presentation of final projects to society of his students.

Simultaneously, on the South Campus of Barcelona of the same UPC, a Postgraduate course was also significantly affected by the pandemic: it had to be carried out remotely, which influenced the semester enrollment that was reduced to only 7 students, all of them international, thus breaking the previous trajectory of the previous courses.

On 11/18/2020, the director of the CITM, Dr. Carles Sora Domenjó, contacted the Director of the ETS of Architecture to explore a potential collaboration to develop the *Ágora* project (fig. 1). The Management had already prepared a basic explanatory document of the intentions, objectives, limitations and resources of the project, together with images of the center itself and other reference images of similar spaces.

The responsible professor appointed by the CITM was Ms. Carolina López and by the ETS of Architecture the designated professor was responsible for the subject 210758, Advanced Technology for the Construction of Interior Space in Architecture, of the Master MBArch-ITA <https://mbarch.masters.upc.edu/lineas-master/innovacion->

tecnologica-en-la-arquitectura/. The challenge was enthusiastically accepted, due to the opportunity to jointly apply the teaching innovation already acquired in previous experiences such as the TOSCA subject, <https://etsavupc.wixsite.com/tosca>, Learning from Barcelona <http://hdl.handle.net/2117/183681> or the Constructive Solutions Contest https://discovery.upc.edu/permalink/34CSUC_UPC/8e3cyp/alma991003158309706711, in response to the strong impact of SARS-COVID19. Another favorable factor for this experimentation was the recent agreement established by the UPC to make digital tools available to the entire community, such as:

- Synchronous platforms for deliberative work between students and these with their tutor, as well as for the presentation of results and their comparison with third parties (MEET).
- Asynchronous platforms for consultation and supervision of the documentation generated throughout the course (MOODLE).
- Collaborative mental maps, capable of making visible the analyzes and proposals presented. (JAMBOARD)



Figure 1. Partial view of the CITM hall after completion of the first phase of the execution works. Source: CITM

On December 21/12/2020, an information day was held (in person and also online) (Fig. 2), with the entire community of CITM teachers, students and administrative staff to promote internal cohesion and the training aspect of the environment. of the Agora project. In parallel, the CITM Students Community opened a survey to all its students with the aim of consulting possible uses and interventions in the Ágora space to be renovated. In this act, the teaching staff of the subject already received from the CITM a technical support dossier by the General Services of the CITM.

On 01/29/2021, the teaching staff of the subject held an online meeting with the students recently enrolled in their subject to inform them of the existence of this real assignment as the training core of the course. The students enthusiastically accepted the challenge, but only a few of the participants declared that they would be in person during its development, so the entire design and execution process would be practically online. This subject has a teaching load of 5 ECTS

and takes place on Tuesday afternoons from 2:30 p.m. to 6:30 p.m. for 14 weeks. Tuesday 02/02/2021 (S1) was the day the subject began with a meeting at the CITM where the CITM representatives themselves (PDI, PAS and student representatives) and some architecture students participated in person. The rest of the students were present online. Once the meeting was over, a first visual inspection of the hall of the building was carried out by the attendees.

The subject was already beginning to work, online, in sessions developed every Tuesday. On Tuesday 02/09/2020 (S2) the need to make various specific requests through the designated CITM professor was verified, such as visiting the building at times of greatest capacity, contacting the commission responsible for the contents to be exhibited and Request information about suppliers who could later participate in the work.

The purposeful work of the students of the subject was carried out during the weekly debate sessions through the JAMBOARD digital platform (Fig. 3). (Cánovas Alcaraz, A. Feliz Ricoy, S., Martín Taibo, L., 2019) consider *“that collaborative work on mental maps is especially interesting when it is carried out digitally, since the contributions can be identified or made anonymously, eliminating physical conditions or those derived from the group’s social relations; the content is worked on simultaneously by all the participants, and the relationships between the inputs provided are established instantly, favoring the visibility and acceptance of ideas external to those provided by each participant”*.

Siguiendo las pautas de (A. Ribot, I. Borrego, J. García-Germán, D. García-Setién, 2012) los análisis previos fueron realizados en común para detectar cual era la pregunta formulada y cual la respuesta esperada: *“posteriormente se loteó el espacio para que cada alumno fuera ponente de un sector que había previamente*

seleccionado, para conformar un proyecto unitario a partir de la suma de propuestas individuales interconectadas. Estas conexiones se producían gracias a una regla impuesta que consistía en que cada alumno respetase la frontera compartida con su compañero adyacente para unirse. El resultado fue una maqueta colectiva compuesta por propuestas individuales ensambladas. Este tipo de estrategias “partir/repartir” permiten abordar colectivamente contextos complejos gracias a la suma de tareas individuales acotadas y más sencillas.”

(Pujolas Maset, P, (2009) considers that cooperative learning implies a positive interdependence of purposes: each team member has a double responsibility: learning the contents of their area and contributing to their teammates learning it. (García Triviño, 2014) adds that students can achieve their objectives if and only if the other participants also achieve theirs. The development of the experience, week by week (Fig. 5), indicated that the students of the subject were already initially willing to collaborate but not necessarily willing to cooperate to the extent that they had not selected among themselves.

On Tuesday 03/23/2021 (S8) the online presentation of the first version of the proposal was made, addressed only to the teacher Mrs. Carolina López (Fig. 4). This previous presentation was very welcome and served to identify the architectural limitations and potentials of the TR12 hall. On 04/20/2021 (S12) a first complete documentary delivery of the entire proposal was made in a DRIVE repository shared with the CITM Management. On 04/27/2021 (S13) the explanatory public presentation of the proposal was made before the CITM Directorate, (Fig. 6 and 7) presenting both the summary images and the technical-economic documentation with sufficient detail to allow his execution. At this meeting, the architecture students were congratulated

for the good result achieved, but at the same time the need to have a significant part of the work already finished before the start of the 2021-22 academic year was expressed. The architecture students were already entering the development phase of their own TFM from that moment, so they no longer had enough time to direct the execution of this work and they proposed to step aside and remain as external consultants of the same. On that date, the CITM Directorate directly assumed the task of executing the work, hiring an external expert in the execution of works.



Figure 2: Blended work sessions from the CITM with its management team Source: CITM

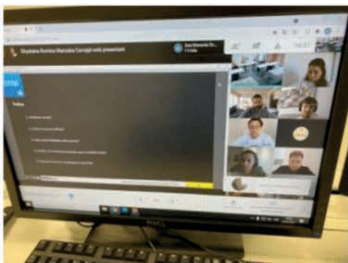


Figure 3: Online work sessions. Source: CITM



Figure 4: one of the first digital visualizations of the project. Source: CITM

Session	Activity	Platform	Link
S0	Offer of participation to students	MEET	
S1	Presentation of the assignment by the CITM community	MEET	
S2	Distribution of activities and responsibilities among students	JAMBOARD UPC	https://jamboard.google.com/d/18oM-zCMjd2NmQEn9F-NqnM4ZY7QjCTg-CMQesDFkWu1do/edit?usp=sharing
S3	SWOT and benchmarking	JAMBOARD UPC	https://jamboard.google.com/d/1PHQ_wTnSiTsvi-9ZWYyq4LLc2FCIfn-GQdlpgUJ-ZnFdxM/edit?usp=sharing
S4	Presentation of options, valuation and selection	JAMBOARD UPC	https://jamboard.google.com/d/1XccANj43_W9w5AHfS8NT7RnX29IM5r7K-corOYpE2X3E/edit?usp=sharing
S5	Visit expert Miquel Angel Julià	JAMBOARD UPC	https://jamboard.google.com/d/1vw5HOvFeZ3R57L-rs1E nR3B0ECU3C-8N3LFXgfZteMBv4/edit?usp=sharing
S6	Joint evaluation by the teacher	JAMBOARD UPC	https://jamboard.google.com/d/1HC-D1OG8z42DPzSi3066EYpFHwDpl7ujz-VI4JIqeiijU/edit?usp=sharing
S7	Preparation of the intermediate presentation	JAMBOARD UPC	https://jamboard.google.com/d/1t-hOxIYj1SNePg-MW0RyC0j8lyr8C-TRPjKiKvXcpTxE9w/edi t?usp=sharing
S8	General essay	MEET	
S9	Presentation to Carolina López	MEET	https://drive.google.com/drive/folders/1ZblSAPJ1c6PSao usyz82p1rbL-QN=-qX5Z?usp=sharing
S10	Presentation Discussion	MEET	
S11	Final version monitoring	DRIVE UPC	https://drive.google.com/drive/folders/1cz3LQVmu4Hiry M5uemckh9K6lF4O-VLSY?usp=sharing

S12	Final delivery	MEET	
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Figure 5: Course development calendar and access links to the materials prepared. Own source

Finally, on 10/05/2021, the execution of the first phase of the project was inaugurated (Fig. 8). The architecture students could not attend in person because they had already returned to their countries of origin once they had finished their master's degree. The inauguration has been collected at <https://www.citm.upc.edu/blog/hello-world-hola-agera-citm/>.



Figure 6: View of the room for blended plenary meetings. Source: CITM



Figure 7: The teaching staff of the subject with the students attending in person. Source: CITM



Figure 8: Together again on the day of the first opening. CITM Source

EVALUATION OF THE RESULTS

The client was very satisfied with the work of the architecture students, as expressed in the different conversations that took place throughout the course. The result did not disappoint his expectations when he decided to entrust this project to some architecture degree students from the same university.

The participating students also considered the experience positive because it relocated them to the most advanced position of junior professional and the teacher himself to the position of professional tutor. The architecture students discovered that their knowledge is not directly applied to the assignment, but rather is previously contributed to a collective debate where its suitability and opportunity for application is considered, an aspect little considered in their previous academic training. They also positively valued interacting with a real client who was a university community from another discipline, with limited financial resources and time. They also appreciated that the publication of their contributions on the CITM website served as a great contribution to their emerging curriculum vitae, thus facilitating their future promotion (Video, 2021).

As for the CITM students, it is non-curricular learning for them, but it is considered complementary to their undergraduate training by indirectly participating in decision-making mechanisms through their delegates. CITM students are currently conceptualizing and organizing the exhibition of their own audiovisual materials in this new space.

The faculty celebrated their role as moderator, emphasizing at all times those decisions already consolidated, pending challenges, aspects to be explored, etc. and promoting at each stage the most suitable students to tackle the successive tasks. He also appreciated the visit of an external expert

invited in the middle of the subject to re-moderate and re-orient the course. He also recognized the personal tension involved in Service Learning to stand up for the entire group of students before the client, a common aspect in the professional practice of architecture but clearly different from academic responsibility.

Although it is a very specific and limited teaching experience, whose innovation lies in the joint and simultaneous application of different already known learning methods, its singular development allows us to reflect on important relevant issues in the teaching of architecture at the master's level.

A first contribution of this experience has been the extraordinary virtualization (VC) of the processes of previous studies, decision-making and communication with the client, without affecting the final quality of the result.

A second contribution has been the maturation of the project-based learning (PBL) methodology. This methodology applied in Architecture Degree studies generally suffers from some aspects such as the lack of restrictions, the lack of specificity, the competitive environment, the tendency to prioritize the orthodoxy of the professor, etc. In this case, the reality of the commission itself helped to establish from the outset what all the restrictions and demands on the team were, and it was only necessary to promote a fully cooperative environment so that the final proposal was unique, shared and agreed upon.

A third contribution, within the framework of collaborative learning (CL), have been the sessions in which the students contributed to the group their work done during the week so that they were debated, accepted and agreed upon by the entire team. The teachers moderated the debate and at the end of each session encouraged the students to voluntarily assume the challenges to be developed for the next session. Here the difference in leadership

and intensity in the students' commitment to collaboration was clearly manifested at some point.

REPLICABILITY

The keys for a new teaching experience to be replicable are its ability to respond to the educational needs of another environment, that the mobilized resources are available in this other environment and that both the teacher and the students in the new environment do not require of a previous training to undertake it.

The students of the polytechnic universities are necessarily oriented to the resolution of cases or projects; In these environments, the academy is very competent, but it usually lacks the ability to simulate circumstances such as the limited availability of resources (time, knowledge and money) as well as direct dialogue with other active participants, such as the client, the financier, the technical supervisor, the public administration, etc.

Digital resources for collaborative work are increasingly easy to mobilize because the large ICT corporations have recently made them available to the ICT services of partner universities. The other essential resource is the collaboration of the General Services of the universities, which almost always show a good predisposition to interact with Postgraduate students.

The students and professors of the Postgraduate level already present a degree of maturity and instrumental training that makes it easier for them to break with the methodologies of the Undergraduate level and to approach with interest training experiences closer to real environments.

CONCLUSIONS

The concurrence of various learning methodologies based on student autonomy and teamwork is highly successful in

Postgraduate studies, because it is aligned with the teaching objectives of this stage when the student is closer to the actual exercise of the profession. These methodologies applied to a real case allow connecting

the training experience of each student with the reality of the contingencies, limitations and inconsistencies of the building sector.

These learning methodologies recognize the diversity of each student and encourage responsibility for it, a motor that activates greater motivation, commitment and participation in the subject, involvement with peers, and development of their critical and communication skills.

The fact of working collaboratively with a shared objective, in a structure analogous to the professional world, allows us to anticipate the professional reality of the future graduate in an integrated way, transcending the model of objectives and disaggregated academic competences of undergraduate studies.

Universities must take more advantage of the framework of Postgraduate subjects to confront their students with the resolution of real problems specific to the university institution (administration, buildings, infrastructures, quality, etc.). This internal teaching exercise can help to overcome the understandable distrust of the senior client regarding the professional capacity of recent graduates.

FUTURE CHALLENGES

Collective decision-making processes are not simple or fast, and even more so in architecture where both conceptual and contingency factors are involved. The participating students had to take great care of their communication skills to convince and persuade their classmates of the goodness of their proposal. Teaching management, both the leadership of the participants and the technical risk associated with collective

decisions, are aspects to be considered in more detail in upcoming Postgraduate teaching experiences, especially in groups of students of greater size and diversity in admission.

Master's studies last 1-2 academic years and are characterized by receiving students from distant degrees. This supposes a richness due to the diversity provided but generates an initial heterogeneity that makes any conventional learning process difficult. All this must be done at a temporary rate that allows a speed of progress in accordance with the temporary milestones imposed by the client. The different speeds of progress of the students as well as their different origins can make this convergence process difficult, but they have shown that it is possible and fruitful.

The processes in building works are complex for architecture students because there are many aspects related to economic processes, production techniques and legal commitments. All of them are aspects that are still little considered in architecture studies and that can undermine the results of the learning processes presented here.

The learning methodologies that grant great autonomy to the student must be supported by other subjects, previous or parallel, that provide knowledge and instruments that provide the skills required by experiences such as the one presented here. The concatenation of both subject profiles must be deepened.

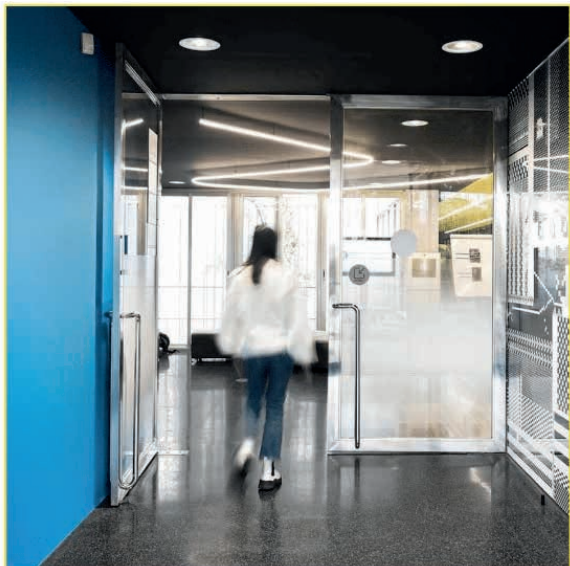


Figure 12: Photograph of the final state of the CITM entrance renovation project developed by architecture students. CITM source.

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