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TEACHING ARCHITECTURAL DESIGN THROUGH CREATIVE PRACTICES

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TEACHING ARCHITECTURE: FROM KNOWLEDGE TO KNOW-HOW

This article reflects on the teaching practice of the architectural design courses, particularly the one introducing students into this subject. Although the architectural design does not gather all the theoretical and practical aspects related to the architectural discipline, it constitutes the central axis of the work of an architect. Hence the complexity and importance of its learning, which is not isolated but transversal, which is neither linear nor unidirectional. Although this article will only delve into the history and evolution of architectural design teaching, two additional lines should be taken into consideration if the study is to be thorough.

Firstly, the importance of the history of architecture for the architectural conception itself should be acknowledged. We must reflect on the present moment, considering history as an intellectual construction that interprets the buildings from the past and the socio-cultural situation that originated them. This history allows us to understand the architecture of older times and to appreciate the position towards the present moment, as well as the expectations for the future of those who elaborated it. Secondly, to prevent the history of architecture from being assumed as a repertoire of shapes, the historical character of the methods, resources, knowledge and functions of an architect in their process of definition of an architectural form and construction of a city must be considered. While these two aspects may be of interest for architects, historians, artists or engineers, the awareness of the architecture teaching history is linked almost exclusively to architects dedicated to teaching.

In order to understand the contemporary method of architectural design teaching, it is important to know its evolution. From considering the action of knowing as the main function to be developed, to the establishment of know-how; from unidirectional teaching whose only transmitter is the teacher, to the acquisition of practical skills giving the student an active role. Therefore, the main objective of contemporary education is to achieve

an integrative, transversal and cooperative learning, which encompasses the traditional theoretical training but approaching it to the reality of professional practice: thought and action, knowledge and know-how. When does this methodological change occur?

The history of teaching architectural design, beyond Vitrivius' treatises and the guild system, may begin in 1562 when Vasari founded the *Accademia del Disegno*. Under the leadership of important personalities such as Cosimo de' Medici or Michelangelo, this first academy of the arts pursued a double purpose: the protection of the best artists and the teaching of young students. More oriented to teaching was the *Accademia di San Luca*, founded by Zuccari in Rome in 1593. Its regulations indicate the existence of *Censori*, twelve guest professors who had to decide who would be dedicated to the drawing of cartoons, heads, feet, hands and drawings *all'antico*, who to the architecture and who to the perspective. The teaching program in the academies of this century and the following, 16th and 17th, merely consisted in a series of lectures followed by drawing practice. The possibility of substituting the learning in workshops for academic courses was not taken into consideration.

In Paris, the artists also sought to raise their social status by setting apart from guilds. In 1648, M. de Charmois requested Louis XIV to create an academy. He provided a memorandum with an artistic education syllabus, pointing out the need of a deep knowledge of architecture, geometry, perspective, arithmetic, anatomy, astronomy and history. The designation of Colbert as vice protector of the *Académie Royale* in 1661 gave the final impulse to this organization. Although it was Colbert who later initiated its fragmentation by creating numerous academies, including Academies of Science, Architecture and the *Corps de Genie Civil*. The initial knowledge focused on construction was herewith divided and the objectives were specialized. Likewise, the creation of the schools of *Ponts et Chauses* and *Polythecnique* meant an attempt to extend the technical training, which was largely forgotten by the academies, but it set permanently the professional division (**1**).

Therefore, it can be said that architecture schools until the 19th century evolved towards a greater subdivision of knowledge, considered as an element external to the individual. Teaching was unidirectional, from teacher to student. However, starting from the late 19th century the so-called New School supported the idea of knowledge as a part of the individual, establishing the stimulus-response as the basis for learning (Bardí i Milà and García-Escudero, 2016, 16-33). From then on, active students consider experience and action, knowledge and emotion as a fundamental educational practice (**2**).

Within the New School there were two different teaching methods: the *Écoles des Beaux-Arts* and the *Bauhaus*. Whereas the first one is identified with classical teaching methods based on redrawing typologies and the analysis of compositional elements; the second is linked with the modern tradition of learning by doing (Dewey, 1951, 88-125). Thus, the *Bauhaus* introduced architecture as a synthesis of the arts and the final point of the evolution of academic education through practice. The teaching of classical ornamental architecture was left behind; the classroom was structured as factory workshops, showing the professional relationships between the artisan and industrial sectors which make the construction a collective work; building in order to learn to think. The training was largely based on the representation, creativity and visual language of a wide range of

1. To follow the historic evolution of the academies of art see Pevsner (1940). In relation to the transmission of architecture through history, the importance of trade in the learning process, and of learning the technique and material to design from the constructive logics, see Boullée & Pérouse de Montclos (1968).

2. For further information about the history of architectural education see Gardner (1993); Goleman (1992); Skinner (1970); Stenberg and Wagner (1986).

disciplines. In its own conception and development, *Bauhaus* developed its teaching program from the equivalence between the artist and the artisan promulgated by Gropius, up to the balance between art and technology pursued by Mies van der Rohe. Thus, Mies's *Bauhaus* is considered as the first school of architecture seen from the contemporary perspective (Swenson and Chang, 1980; Archilles et.al., 1986). It is architecture transmitted from a method based on the dual concept of art and craft. It is architecture learned in the design workshop, where imagination and discovery are structured through a set of rules that identify architecture as scientific knowledge, subject to observation, reasoning, practice and experience (Scank, 2007).

TEACHING ARCHITECTURAL DESIGN: INITIAL COURSE

The project is the most creative moment of the entire building process. The most interesting aspect of the project is its role of previous formalization: It is an intellectual creation meant to serve as a guide and reference in a very complex process. Karl Popper (1935) discredited the value that researching the way in which ideas are generated has for the logical analysis of scientific knowledge (**3**). Based on this argument, we can state that the way in which new ideas appear is not important for a discipline such as architectural design, art and craft, subjectivity and science. Therefore, what happens from that moment on is important: the steps to follow, the processes and the intermediate states that lead from that idea -which may or may not constitute the source of the project- until its sufficient materialization, for each task assigned in the construction process.

In fact, teaching architectural design takes place between two separated poles. The first pole focuses on the promotion of creativity in the students, in order to increase their capacity to produce new ideas. The second pole concentrates on disciplinary training: the development of their capacity to correctly accomplish ideas from the knowledge of parameters that operate the definition of the form and its critique. For the correct development of this double capacity of conception and materialization, it is necessary to transmit theoretical knowledge and practical skills, as Carles Martí Arís proposed (2005) referring to the importance of the dialectical process between thought and action. Both thought and action require reflection; an analysis and continuous confrontation among numerous alternatives and their respective decisions, which must be adopted based on the internal logic that establishes the relationship among the parts and with the whole. Therefore, the analytical, or more broadly cognitive, aspect that every project entails must be considered. Giorgio Grassi (1980) already noted, in *La Arquitectura Como Oficio y Otros Escritos,* the importance of the architectural project in order to delve into the knowledge of architecture and the role of analysis in this. This analysis that must refer both to the generic aspects linked to the disciplinary knowledge of architecture and its history, as well as to the particular aspects that define and specify each project and place it in a specific spatial and temporal context. In all this reasoned process, drawing fulfils the main function in the project, which must be understood as a means of representing reality and not as a result. The drawing, as accurate as possible, becomes a procedure of analysis and knowledge, thought and action, while providing a graphic model that allows to establish the necessary criticism of partial and global results.

Considering that the subject of architectural design is very wide and it is taught in all courses of the Degree in Architecture of the Technical School

3. "The question how it happens that a new idea occurs to a man -whether it is a musical theme, a dramatic conflict, or a scientific theory- may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge" (Popper, 1959, 7).

of Architecture of Valencia (ETSA-UPV), this article focuses on the teaching practice of the first year. It is the very first subject that puts the students in contact with the world of architectural design (**4**). Hence, this subject has a propaedeutic initiatory character. The students face architecture from a critical and practical point of view for the first time. It must be noted that since 2010, when the Bologna curriculum was implemented, the architectural design courses are introduced in the first year of studies, as opposed to the previous practice where students were initiated in architectural design on their second year. Therefore, given its initiatic character and the student's low level of architectural knowledge, it is important to choose well the architecture constituting this first approach. It is also essential to develop techniques to read, analyse and critique that will follow the future architect throughout his professional life.

The learning difficulty of this first design subject implicitly involves setting specific objectives. Consequently, during the first year only the foundations of knowledge can be defined, and the basic learning mechanisms can be set. It is the subject where a greater teaching creativity is required, from clear and to a certain extent abstract, pedagogical instructions. This was obvious both in the *Bauhaus* and in the *Écoles des Beaux-Arts*, whose initiatory courses assumed experimental propaedeutic activities linked to formal and visual abstract exercises. To achieve these goals, according to our experience, hand drawing and the three-dimensional modelling should be considered as the main material tools of the course, as both support the process of reflection about the key elements of architecture. Through hand drawing and modelling, the students learn to see architecture and understand its essence, understanding that space is the true key element beyond the visual form. As Bruno Zevi (1971) pointed out, the primordial character of architecture, the character by which it is distinguished from other artistic activities, appears because it is acting through a three-dimensional vocabulary involving people**.** Thinking with the hands provides complete control of the project through a process of analysis, reflection, experimentation and improvement, until a result according to the available conditions and provided intentions is achieved (**5**)**.** Nowadays this process is largely affected by graphic digitalization.

TEACHING METHODOLOGY

The teaching methodology presented here is applied in the subject of Design Studio 1, taught in the second semester of the first year of the Bachelor's Degree in Architecture. The creation and the structure of the subject are defined by the Bologna 2 syllabus, which states that architectural design must be introduced in the second semester of the first year of studies, with a study load of 4.5 ECTS distributed in two 90-minute lessons a week.

Teaching Design Studio 1 corresponds to the Architectural Design Department at the *Universitat Politècnica de València*, which is organized in teaching units called workshops, a concept grounded on modern pedagogy methods for the architecture studios experimented in the *Bauhaus*. A workshop establishes a workgroup with a reduced number of students and professors, whose main objective is to exchange knowledge. It results in an opportunity for theoretical and practical joint research on specific topics, which respond to general, specific and cross-curricular competences as defined in the syllabus and this subject's study plan. In this case, they are the initiation and development of the student's capacity of analysis,

4. ETSA-UPV is one of the architecture schools with the greatest history in Spain. Created in 1965 as an extension of the school of Barcelona, it later gained independence and became part of the *Institutos Superiores Politécnicos*. Additionally, its educational policies have been studied for their protest character during the 1960s, when the School underwent a series of political and social changes concurrent to the transformations of Higher Education taking place in Europe. For further information, see Domingo (2018).

5. *Thinking with Your Hands*: term used and developed by Louis Kahn and Alberto Campo Baeza (Kahn, 1931); (Campo Baeza, 2009).

synthesis and practice with the architectural object using hand drawing and 3D modelling. The research presented in this article is carried out simultaneously in 6 groups by 4 teachers from Workshop 2, comprising approximately 150 students in total.

Motivation Based on Historical Methodological References

Over the years, this group of professors has been reflecting on the teaching method used, trying to evolve and improve its application each academic year. The initial methodology pursued the development of the analytical capacity of the students: firstly by recognizing the elements that constitute the architectural object and secondly by enhancing the implementation of the concepts acquired accomplishing their first architectural project. It was a basically linear process, which started from theory, continued with the analysis of prestigious works of the history of architecture and finally reached the synthesis achieved through the accomplishment of a delimited architectural project. However, after the application of this methodology during several academic years, the professors encountered the difficulty of many students to transfer what was learned in the analysis phase -structured and directed theory- to the project phase -more free and creative practice. This fact produced a breach in the teaching system, because it generated disorientation for the students at the inflection point between both phases.

Hence, the main studies about learning were reviewed, particularly David Kolb's *Experimental Learning Theory* (1984). He pointed out that the learning cycle is not linear, but circular, and that the order of the stages is not steady, but it depends on the personal characteristics of each individual. This way, the truly meaningful learning occurs by combining certain procedures of perception and understanding (**Figure 1**). As shown in **Figure 1**, the learning circle activates four different capacities: the concrete

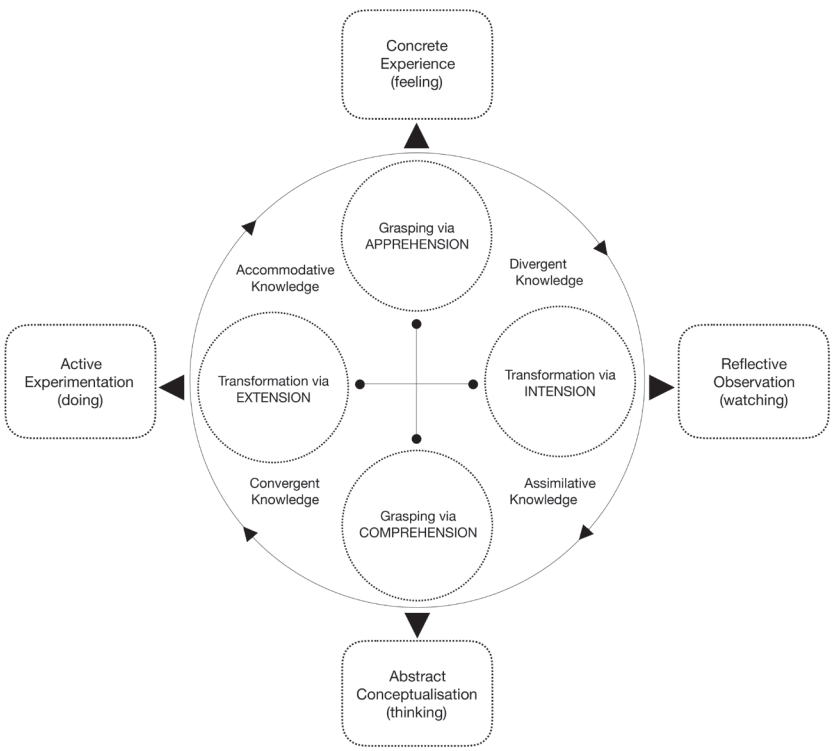


Figure 1. Kolb's Learning Cycle, 1984 (The authors, 2018).

experience, through which the students are capable of getting involved in new experiences; the reflexive observation, whereby they process these experiences and observe them through multiple perspectives; the abstract conceptualization, by which they create new concepts and integrate their observations in logically solid theories; and active experimentation, through which they make decisions to conclude the problem. Whereas the graphic represents a logical sequence of these stages and their associated activities (feeling, watching, thinking and doing), this doesn't always have to be their order. The cognitive process must be understood as a circular scheme that successively goes through each of the activities and whose starting point can differ.

At the same time, various educational experiences in the field of architectural design were also studied. One of them generated special interest and therefore was taken as a reference: the one carried out by László Moholy-Nagy in the first year of the *Bauhaus* school. Moholy-Nagy sought to train students in topics such as spatial organization, formal balance or material nature using formally simple exercises, based on the construction of sculptural objects composed of different materials (Wick and Grawe, 2000). This experience showed the importance of the construction of abstract models during the design process, the model as a tool of formal, spatial and material experimentation. We also studied the practices developed by Mies van der Rohe, Ludwig Hilberseimer and Walter Peterhans, first in the Bauhaus and later in the Illinois Institute of Technology (IIT) (Swenson and Chang 1980, 47-48). As described by Kevin Harrington in *Order, Space, Proportion - Mies's curriculum at IIT* (Achilles et al., 1986, 49-68) the students of the first courses began studying mainly three architectural tools: drawing, which taught them proportion, precision and the relationship between the parts; the study of materials, so that they knew how to work with each of them; and the spatial configuration, from the simplest to the most complex (**6**).

Likewise, during the first years that Mies was the headmaster of the Armour Institute of Technology, he found that although new students seemed to understand what he was explaining to them about the importance of proportion, they did not show the slightest sense of it when they had to apply it in their exercises. For this reason, he commissioned Walter Peterhans to prepare a new course called Visual Training, specially designed to train the eye and to form the sense of proportion, and whose methodology became one of the keys to success of the teaching plan of the IIT. It was based on abstract exercises from photographic collages, in which students worked with the textures of materials and compositional relationships among linear elements, plans and volumes (**7**) (**Figure 2**).

Thus, and by analysing the history of architectural design teaching, the main purpose of this research is to establish a new teaching approach in which the transfer of knowledge between the analysis phase and the project phase is enhanced (**8**). The methodology is set on the introduction of a series of activities based on reflection, conceptualization and experimentation which are typical for learning by doing, from the model, photography and hand drawing. These activities take as their source the influence of history and they are reinterpreted, acting as a bridge between architecture theory and its subsequent practical application in the project phase (Gibbs, 1988).

6. "(…) in his first year he learns drafting, projections, descriptive geometry, perspective and freehand drawing and sketching. These exercises are very carefully prepared to enable him to visualize relationships between point, lines and plane in space and to present solutions in a way which is not only clear to the observer but is also an aesthetically valid presentation in itself" (Malcolmson, 1959, 41).

7. "The first introduction to the problems of proportion and the relationship of forms, spaces, colours, and textures is given… in the course called Visual Training taught by Mr. Walter Peterhans. Here form and colour relationships are studied in the abstract through the making of very carefully considered and exactly executed collage plates composed of pieces of paper of various colours and textures cut into the desired sizes and shapes" (Dearstyne, 1944, 5).

8. For further information about the different courses of Design Studio 1 in Spain see Carbajal-Ballell and Rodrigues-de-Oliveira (2016); Mària Serrano et al. (2018).

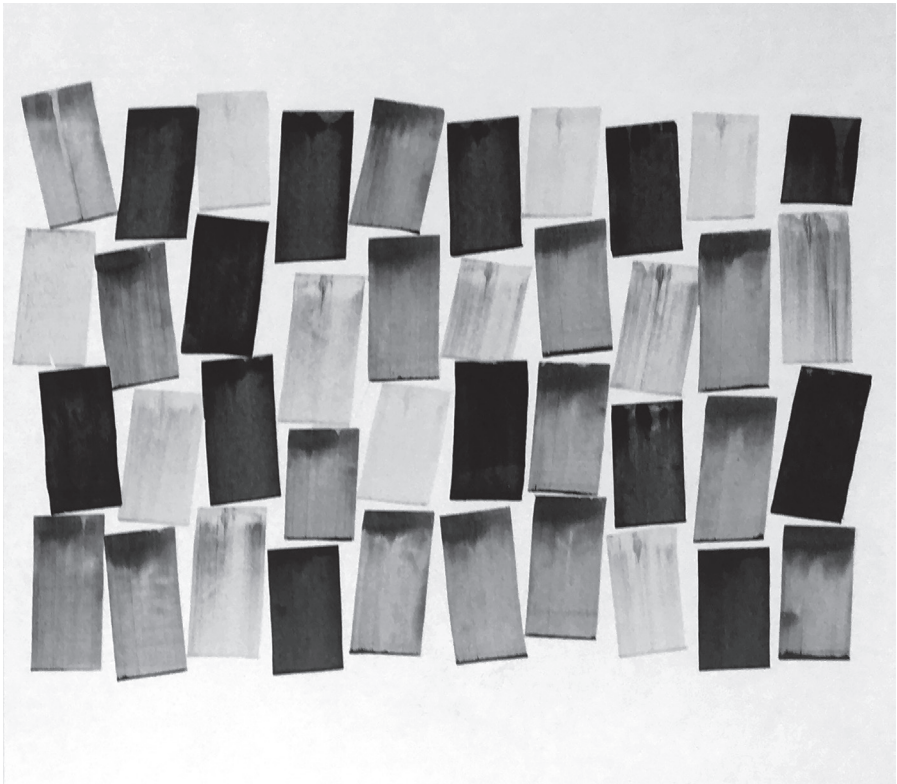


Figure 2. Visual Training Course. Walter Peterhans, IIT. Exercise with Textures, January 1955. Student: John Munson. (© John Munson)

Methodological Development, Description of the Activities and Results

Given that the greatest innovative interest of the methodological approach lies in the inclusion of these creative activities in a fundamentally analytical and receptive phase, the description focuses on the development of these practices as a link between the theoretical analysis and the project action. They all span through the same period: a week, two one hour and a half classes. The first class has a theoretical-practical character: it is the moment when the activity is explained through examples of previous years. The second class is a collective critical session where all the results are shared, encouraging the discussion among students.

The first objective of the new activities is to increase the creative capacity of the student from the first moment of the analysis phase. To achieve that, certain practical skills are trained to contribute to the creation of forms and spaces. These forms are basically shaped from a single material, so that students experiment with its composition and/or grouping laws to achieve different types of spaces depending on its workability and properties. The students are also expected to train and develop their spatial vision by creating spaces, which are developed intuitively through plans that fold and modulate. This new methodology also seeks to improve the ability of students to appreciate the influence of light on the perception of space. As a previous step to being able to imagine it, it is important to know from where to look and how to photograph the space created, in relation to the light. Students are also expected to understand a given spatial organization, appreciate the relationships generated among the spaces and assign the most appropriate activities according to their characteristics. Finally, the methodology is intended to increase the ability of the students to recognize how materiality affects the definition and perception of space

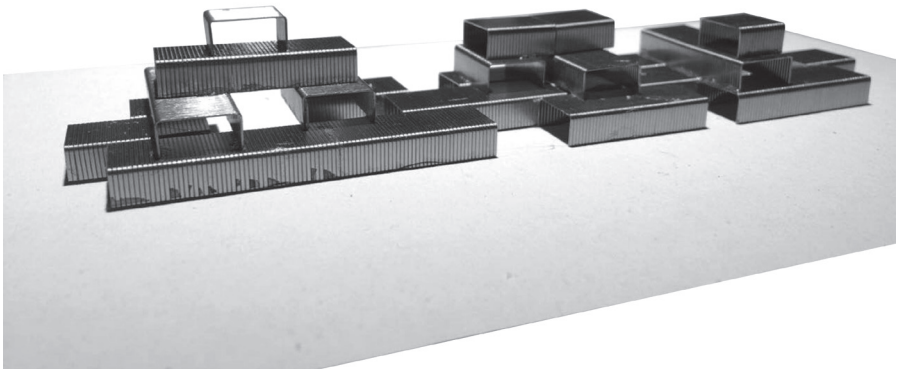


Figure 3. Ideation-Composition Activity, Thinking with Your Hands. Student: Enrique Martínez. Material used: staples. (© Enrique Martínez, 2018)

through experimentation with materials of diverse characteristics. In order to achieve the mentioned objectives, the creative activities correspond to the four conceptual blocks in which the teaching is organized during the first part of the course: ideation-composition, space-light, function and materiality. As follows, we offer a summary of each of them and their results, together with images that exemplify the concepts sought and the results obtained.

Thinking with Your Hands

The first activity is based on the construction of models manipulating material elements, in order to allow the student to experiment with the compositional systems of architecture. The activity consists in building the model of a living space in a natural environment at scale 1 to 100, meeting two basic rules: it must be inscribed in a cube 10 cm wide on each side and use only one previously assigned material. Furthermore, the transformation process of each material is defined by selecting a specific action from the list prepared by Richard Serra (2011), *Verb List Compilation: Actions to Relate to Oneself* (**Figure 3**).

The activity evaluates how students explore formal possibilities of a material, and study the different ways to transform it and connect it in order to reach a consistent order system. From the choice of material and its consequent composition and construction, we can extract three ways of shaping architecture based on the material: linear, surface and volumetric. The work with chopsticks or spaghetti has allowed composing from rectangular, triangular and warped surfaces using the succession of linear elements. It supports the configuration of light spaces, thanks to the dematerialization of its limits. The work with cardboard or staples has led to the configuration of dihedrons or trihedrons by folding their faces, producing so spaces with more defined boundaries, where the difference between interior and exterior space is more evident. Finally, the construction with foam required the material to be carved, which generated more volumetric compositions where the deep limits acquired the value of a spatial container (**Figure 4**).

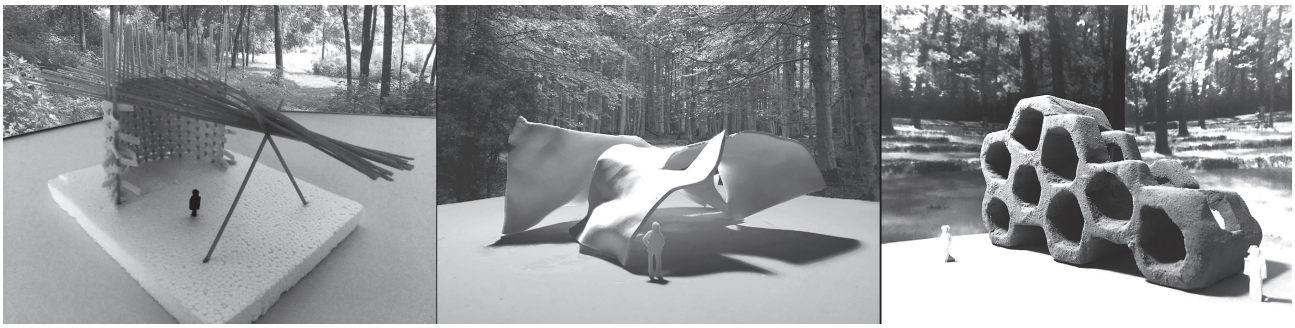


Figure 4. Three Ways of Composing: Through Lines, Surfaces and Volumes. Students: David Faubel, Jordi Edo, José Luis de Donpablo. Materials used: spaghetti, EVA foam and floral foam (© David Faubel, Jordi Edo, José Luis de Donpablo, 2018)

Folding the Space

Activity two is based on transforming a flat element into a three-dimensional object, in order to enhance spatial experimentation. The work consists in creating an element which can generate spaces intuitively, starting from a piece of a foam board, followed by specific strict cutting and folding rules using a three-dimensional compositional logic. In addition to the creation of the space, the representation of the result is requested on photographs, where the students capture the relationship between the space in natural and artificial light conditions (**Figure 5**).

The activity provides the student with the opportunity to experience the possibilities originated from folding specific surfaces. The pre-established limitations motivate the students to create complex solutions analysing the intrinsic possibilities of the compositional system. Regarding the progress of the activity, it is interesting to note that at the beginning the students needed to reflect on the idea of spatial order that they wanted to develop. To accomplish it, sketches and paper models were used, which allowed the students to embrace the concepts exposed in the theoretical classes. We can draw several interesting conclusions from the final results. Firstly, folding surfaces involves creating boundaries with a specific directionality; limits which allow defining interior and exterior spaces and, at the same time, establish the relationship between them. The generated spaces have different spatial characteristics: horizontal, vertical, serial, superimposed space, and alike, establishing an intriguing balance between full and empty spaces. Secondly, folding involves a partial subtraction of the floor plan, empty parts are interpreted as landscaped or unpaved space. Thus, the balance between the full and the empty of the ground level plays a

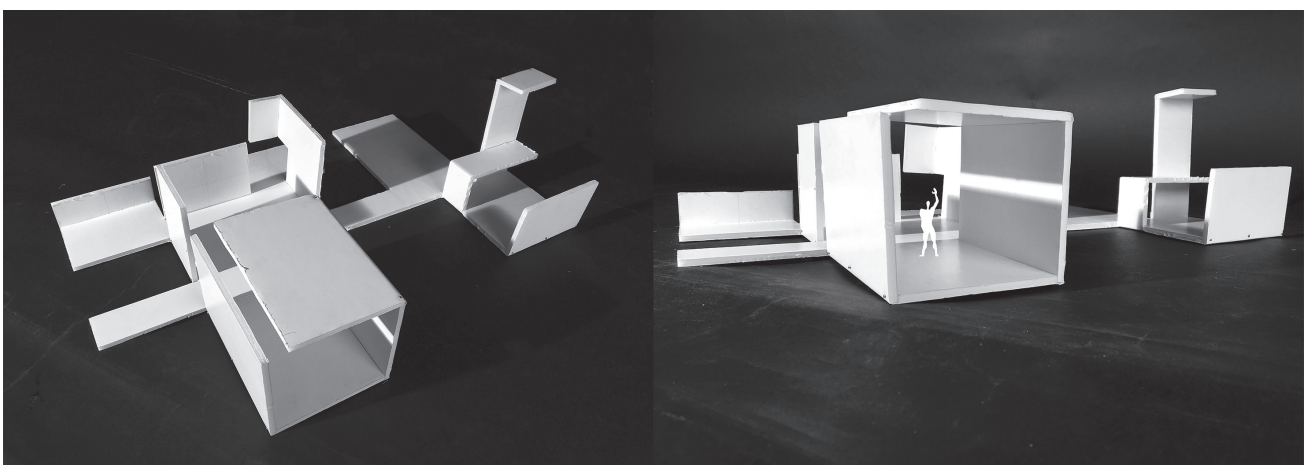


Figure 5. Space-light Activity, Folding the Space. Student: Keshia Della Valle. (© Keshia Della Valle, 2018)

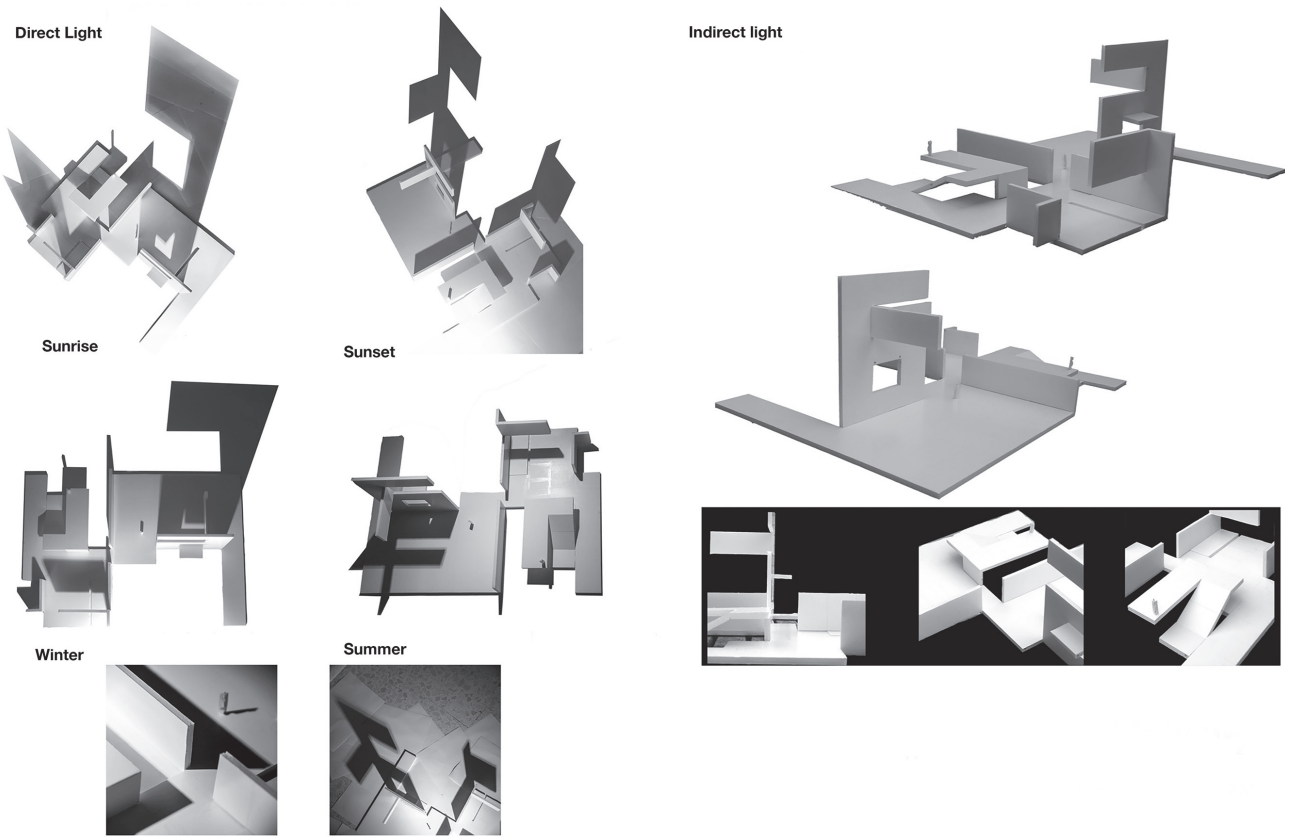


Figure 6. Documentation of the Process and Light Management. Student: Samuel Hernández. (© Samuel Hernández, 2018)

fundamental role in the composition process. Thirdly, the use of scale is crucial in the progress of the exercise. Some works seek to build large massive pieces, establishing an order based on few elements. Others, on the contrary, are committed to a greater fragmentation of pieces, creating a spatial universe of great complexity and richness. Finally, it is important to evaluate the way in which students document both the process and the final product, with photographs in which they study the point of view of perception of space, as well as the type of lighting (**Figure 6**).

Inhabiting the Space

The third activity requires the conversion of an abstract space into an environment with a specific function. It consists of a dihedral representation of the model from activity 2 and its transformation into a habitable architecture, formed by several spaces with specific characteristics that must be designed and furnished accordingly. The activity is coordinated in two parts: the first part consists in drawing the floor plan, elevation and section of the model and the second part includes distribution and furnishing of the area in order to turn them into spaces for domestic use dedicated to activities such as resting, eating, leisure and work (**Figure 7**).

The third activity allowed students to become aware of the dimension of spaces and their relationship with the activities of living. During the development process of the activity we have observed three stages. The first stage corresponds to drawing the spaces developed in the model of activity 2, in which students must choose the most appropriate plans and represent the composition correctly. This phase is of great importance,

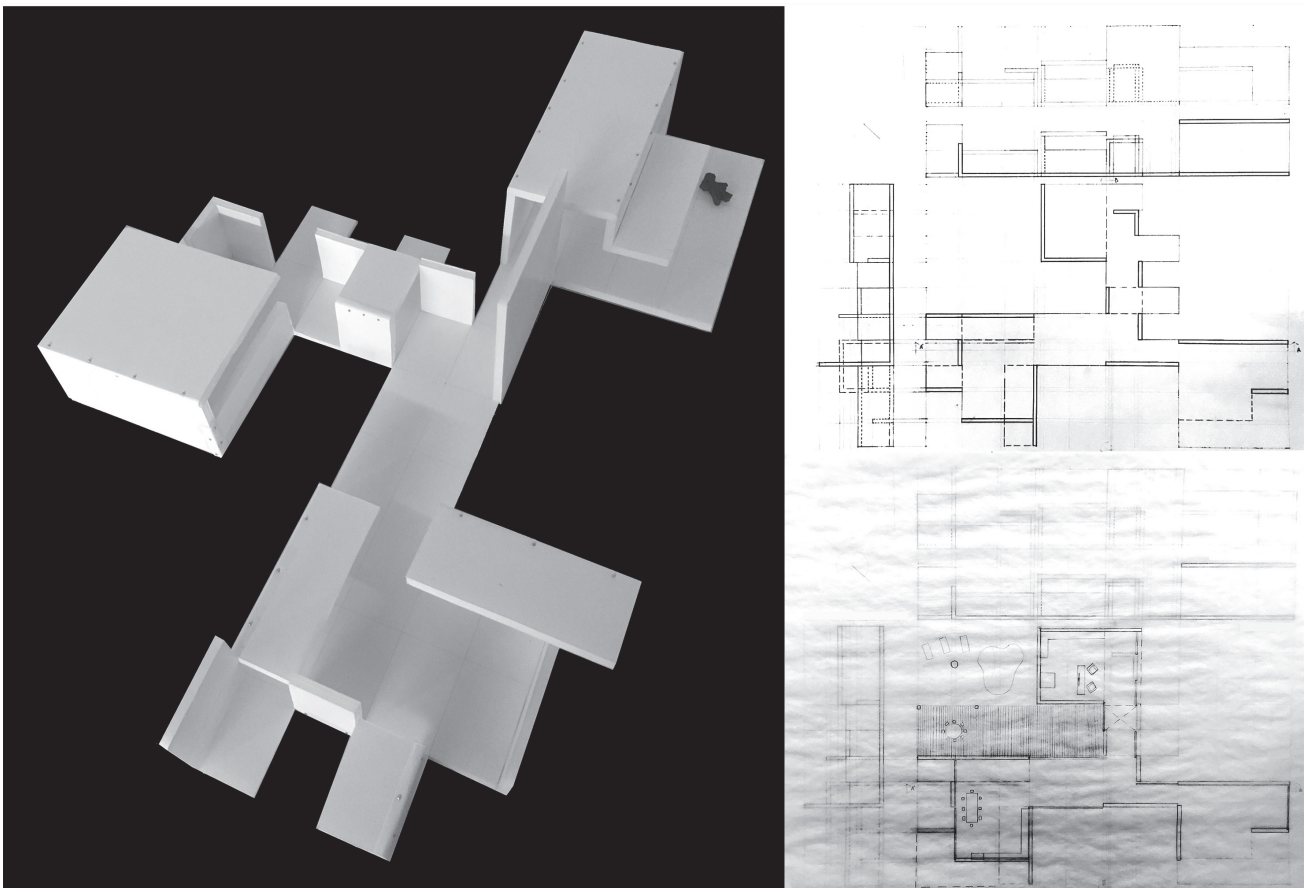


Figure 7. Function Activity, Inhabiting the Space Student: Marc Campos. (© Marc Campos, 2018)

since these plans will be the basis of the exercise. The second phase consisted in recognising elements that define the functions of living, so that students had to measure and draw the furniture that defines the spaces of a house, as well as to understand the relationship among the elements. Finally, the third phase was dedicated to the distribution of the spaces and its graphical representation, so that students could experiment with the organization of the space. This activity led to very interesting results, allowing students to perform functional organization for the first time and, therefore, get familiar with situations that must subsequently be developed in the project phase.

Building the Space

The fourth activity resumes part of the methodology of the first activity, suggesting again the configuration of the space using the properties of the material. However, on this occasion, the space will not be the result of working with a single material but of mixing and juxtaposing three materials that are commonly used in the construction of architectural models, such as wood, cardboard, polycarbonate, methacrylate, metal sheets or the wire mesh. The students are asked to structure a space using order systems derived from groupings of materials that are easily identifiable with basic elements of architectural construction, such as pillars, beams, walls, slabs or roofs, but at the scale of a model. They must also include certain material qualities such as the degree of transparency, rigidity, roughness, texture or colour (**Figure 8**).

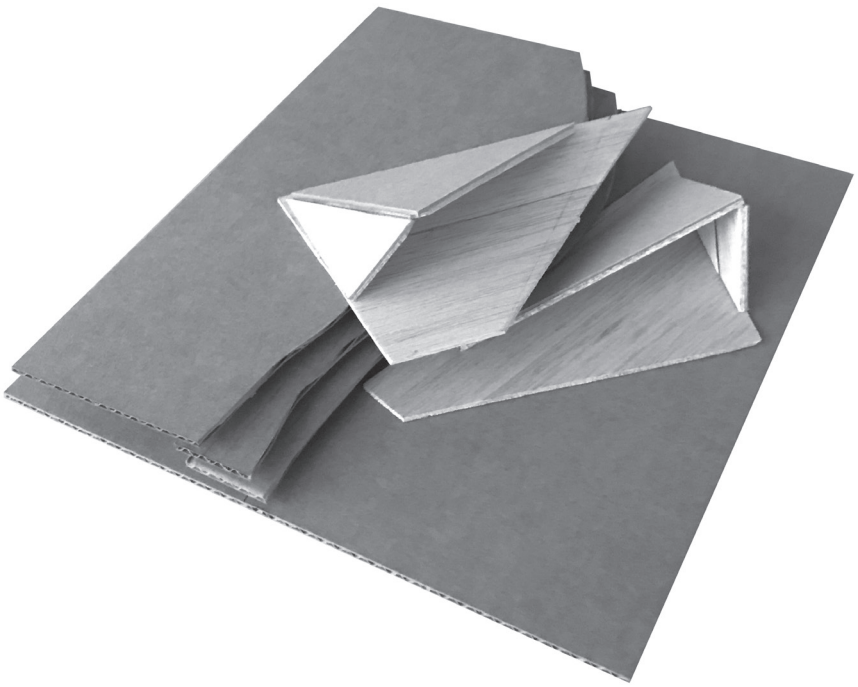
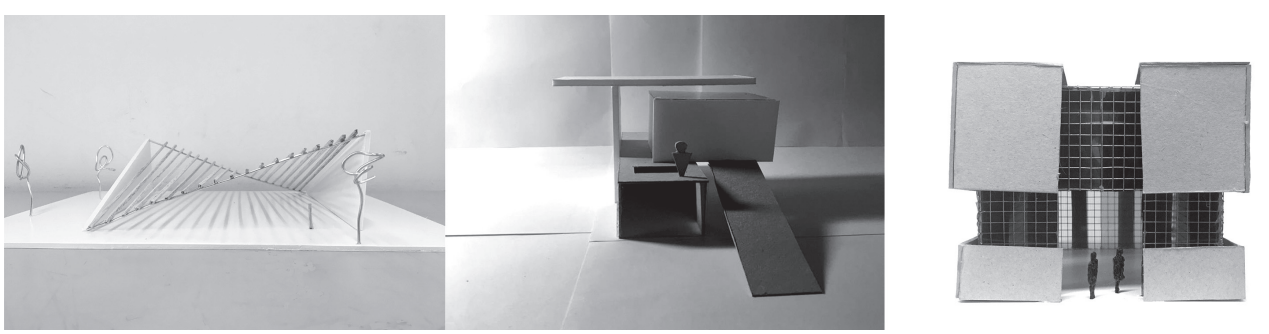


Figure 8. Materiality Activity, Building the Space. Student: Álvaro Ibáñez. Material Used: Cardboard and Balsa Wood (© Álvaro Ibáñez, 2018)

The last activity provided a synthesis of all the concepts studied in the analysis phase. The results obtained from the exercise show that the students synthesized a large part of what was learned during the activity. Elements such as composition, space and materiality are used as relevant parts when creating an architectural object. The students have combined three materials with a compositional logic, assigning them a specific role in the whole. Lines, plans and volumes are coordinated to provide complex solutions, which seek to delve into issues such as rhythm and repetition, full and empty, open space and closed space, light and shadow, static and dynamic space, heaviness and lightness, verticality and horizontality. These are, in conclusion, exercises of great abstraction that deal with fundamental issues of architecture. Furthermore, the idea of a shelter, given in the instructions of the activity, is also present in the reflections of the students. Sometimes it is shown as a space which is clearly protected from the outside, using categorical limits, but sometimes it is a space which is much more open to outside, enhancing the views. Or even, through intermediate solutions, when the architecture seeks to capture a part of that exterior to be held within a protected space. The spatial richness of the results could hardly come from a plan drawing, rather from the work in volume using a model, the tool that makes it possible (**Figure 9**).

Figure 9. Open, Half-open and Closed Compositions. Students: Joaquín Escolano, Arantxa Gil y Alberto Nadal. Materials Used: Cardboard, Wire and Acetate Sheets (© Joaquín Escolano, Arantxa Gil y Alberto Nadal, 2018)



The methodology of these four creative activities combines the construction of scale models, drawing and photography. It also helps the students to immediately and easily recognize the analysed concept, allowing them to improve their spatial vision. Its three-dimensional, material and manual character, learning by doing, combines an experimentation process able to encourage the creativity and motivation of the students. In these activities learning takes place not only while producing, but specially afterwards, with the reflection on what has been produced and the critique in the classroom. Returning to the terminology used by David Kolb (1984), the learning cycle begins with a specific experience, working on a model, followed then by a reflection through observation and conceptualizing the reflections, which can eventually lead to more general conclusions. This cycle is called by Kolb abstract conceptualization. The last phase of active experimentation will follow later, when these abstract concepts, or part of them, are applied in the accomplishment of the project in the second part of the course.

CONCLUSIONS

The implementation of the activities has proved the high educational value of creating knowledge through processes that encourage active and creative participation of the students. On the one hand, developing activities including the construction of models is positive for intuitive learning. It allows the students to directly recognize the consequences of their actions during the constructive process and their implications on the final result. On the other hand, the activities carried out using hand drawing have confirmed the value of hand drawn floor plans as a tool to determine the results and check their correctness. Both manual methods, together with photography, imply a work of reflection that includes previous analysis, an approach to alternatives and a verification of the solution adopted, so that the full learning process is completed. Likewise, they have allowed a solid foundation for the theoretical knowledge transmitted, understood not only as concepts that can be observed and analysed in reality, but also as tools of the creative process itself.

In order to discover the perception of the students regarding the importance of creative practices for the preparation of their project, a survey was carried out among those who have participated in the experience. The results of the survey reveal that, from the four accomplished activities, the ones related to the topics of space-light and function are considered as more useful, while the activities of ideation-composition and material create doubts for 8 of every 100 students (**Figure 10**). Although the feedback is very positive, it is worth wondering about the reason why some of the students do not recognize the importance of the practices focused on the architectural idea and the material. The cause may be the greater difficulty involved in these two concepts or the complexity of the activities. In this sense, we must be aware that we are working with first-year students and that understanding both concepts of idea and materiality requires a certain maturity supported by the acquired knowledge. Furthermore, working with real materials involves extra difficulty in comparison to other more abstract practices where the instructions to follow are more specific from the beginning. In order to continue improving the transfer from analysis to project, the transformation of these activities is planned, providing contents that

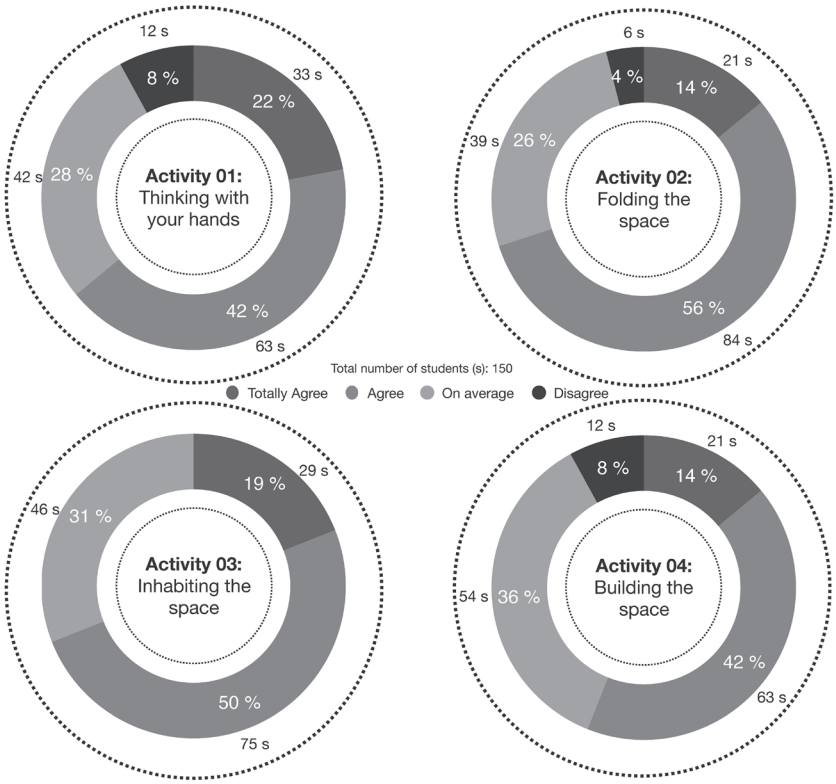


Figure 10. Analysis of the Results of the Survey (The authors, 2018)

generate an even better connection with the studied concepts and reduce their complexity.

From the point of view of the teaching plan, working with models has been positive for students in many aspects. Firstly, they understand the physical and constructive value of the architectural project. The creation of a tangible object is highly motivating for them, as they are able to see their abstract ideas realized in real physical objects. The constructive process defines the idea, the architecture as a built idea. Secondly, students train their visual skills, practicing the perception of form and space. The material brings sensations through its textures and tonalities. The direct manipulation of form and light allows recognizing in real time the various possibilities for the project to evolve. Thirdly, it will promote awareness of the trades involved the material process and the importance of mastering the technique to obtain good results. Fourthly, the students are aware of the dimensions and proportions of spaces in relation to people, interiorizing the relationships between abstract measuring units and their translation to the spatial reality.

In conclusion, it can be stated that the introduction of creative practices has achieved the objectives, guaranteeing a greater transfer of knowledge between the analysis phase and the design phase. These activities were also useful to practise certain skills or abilities that allowed the students to approach the design exercise with greater ease and maturity. The projects were not considered just as the resolution of a functional program, as in previous courses, but as the creation of an architectural critique, where the compositional idea and the space layout are the real key elements. All in all, it can be concluded that the experience of working the architectural

design through abstraction and through the manual-constructive exercise is an effective learning method, especially for first year students. The students learn through discovery, through sensitive experiences and tangible objects: they build as they think and they check that their ideas are possible. Therefore, this practice will continue to be experienced, to evolve and to be perfected in the future, through the analysis and reflection of the results obtained in the successive Design Studio 1 courses and, of course, in comparison to similar experiences in other schools. It is a constant task, a process that is ever adapting to the new generations, as the teaching in the first years is responsible of spreading the main tool for the student's evolution: their passion for architecture.

BIBLIOGRAPHY

ACHILLES, R., HARRINGTON, K., MYHRUM, C. (1986) *Mies Van der Rohe: Architect as Educator 1938-1978,* University of Chicago Press, Chicago.

BARDÍ I MILÀ, B., GARCÍA-ESCUDERO, D. (2016) Dos Modelos Pedagógicos: Conocer Versus Saber Hacer, *Textos de Arquitectura, Docencia e Innovación*, Universitat Politècnica de Catalunya, Grup per a la Innovació i la Logística Docent en l'Arquitectura; 16-33.

BOULLÉE, E-L., and PÉROUSE DE MONTCLOS, J.M (1968) *Architecture, Essai sur l'Art*, Hermann, Paris.

CAMPO BAEZA. A. (2009) *Pensar con las Manos*, Nobuko, Buenos Aires.

CARBAJAL-BALLELL, R., RODRIGUES-DE-OLIVEIRA, S. (2016) *Inmersión en el Proyecto Arquitectónico: Ideación, Debate y Construcción,* JIDA'16, Editorial Universitat Politècnica de València; 70-84.

DEARSTYNE, H. (1944) Basic Teaching of Architecture, *Liturgical Arts* 12(3) 5.

DEWEY, J. (1951) La Ciencia de la Educación, *Teoría de la Educación y Sociedad*, Editorial Losada, Buenos Aires; 88-125.

DOMINGO, D. (2018) Dualities in Architectural Training: The Architecture School of Valencia (1968-1975), *Journal of Technology and Science Education* 8(3) 192-203.

GARDNER, H. (1993) *Frames of Mind: The Theory of Multiple Intelligences*, Basic Books, New York.

GIBBS, G. and GREAT BRITAIN (1988) *Learning by Doing: A Guide to Teaching and Learning Methods*. FEU, London.

GOLEMAN, D. (1992) *La Inteligencia Emocional,* Kairós, Barcelona

GRASSI, G (1980) *La Arquitectura Como Oficio y Otros Escritos*, Gustavo Gili, Barcelona.

KAHN, L. (1931) The Value and Aim in Sketching, *T-Square Club Journal* 1(6) 21.

KOLB, D. (1984) *Experiential Learning: Experience as the Source of Learning and Development*, Prentice-Hall International, Hemel Hempstead, Herts.

MALCOLMSON, R. F. (1959) A Curriculum of Ideas, *Journal of Architectural Education* 14(2) 41.

MÀRIA SERRANO, M., MUSQUERA FELIP, S., BERIAIN SANZOL, L. (2018) Basic Learning of Form, *Journal of Technology and Science Education* 8(3) 155-68.

MARTÍ ARÍS, C. (2005) *La Cimbra y el Arco*, Fundación Caja de Arquitectos, Barcelona.

MUÑOZ COSME, A. (2008) *El Proyecto de Arquitectura. Concepto, Proceso y Representación*, Editorial Reverté, Barcelona.

PEVSNER, N. (1940) *Academies of Art, Past and Present*, University Press, Cambridge, the Macmillan Co., New York.

POPPER, K. (1935) Logik der Forschung, Verlag von Julius Springer, Vienna, Austria (1959), *The Logic of Scientific Discovery*, Hutchinson & Co, London (first English edition).

SCHANK, R. (2007) *Solo se Aprende Haciendo. Entrevista de Eduardo Punset en Redes Crisis Educativa.* [https://www.youtube.com/watch?v=tw1VVjvMF9k] Access Date (02.01.2019)

SERRA, R. (2011) *Verb List. 1967–68. Graphite on Paper, 2 Sheets, Each 10 x 8" (25.4 x 20.3 cm)*, The Museum of Modern Art, New York.

SKINNER, B. F. (1970) *Tecnología de la Enseñanza*, Editorial Labor, Barcelona.

STENBERG, R.J., WAGNER R.K. (1986) *Practical Intelligence*, Cambridge University Press, New York.

SWENSON, A., CHANG, P.C. (1980) *Architectural Education at IIT*, Illinois Institute of Technology, Chicago.

WICK, R.K., GRAWE, G. D. (2000) *Teaching at the Bauhaus*. Hatje Cantz, Ostfildern.

ZEVI, B. (1971) *Saber ver la Arquitectura: Ensayo Sobre la Interpretación Espacial de la Arquitectura*, Poseidón, Buenos Aires.

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Anahtar Sözcükler: Mimari öğretim; mimari tasarım; yaratıcı uygulamalar; maketler; çizim.

YARATICI UYGULAMALAR ARACILIĞI İLE MİMARİ TASARIM EĞİTİMİ

Bu makale mimari eğitiminin temel parçası olan mimari tasarım öğretimini araştırmaktadır. Çalışmada, yaratıcılığın pratik beceri ve teorik bilginin birleştirildiği bir eğitim ile tamamlanması gerektiği göz önüne alınarak, mimari üretim sürecinin en yaratıcı eylemi olan tasarım hakkında bilgi edinmeye çalışılmaktadır. Buna dayanarak, bu makale*Valensiya Politeknik Üniversitesi*, Teknik Yüksek Mimarlık Okulu'ndan (ETSA-UPV) dört öğretim görevlisinin birinci sınıf çalışması olan Tasarım Stüdyosu dersinde edindikleri tecrübeleri ortaya koymaktadır. Bu dersin bir bilim dalına başlangıç olması, mimari tasarım alanının öğrencilere tanıtılmasının getirdiği karmaşaya ek olarak güçlükler ortaya koymaktadır.

Makale, mimarlık eğitiminin tarihsel geçmişini ele alarak, öğretim deneyimi boyunca yaşanan farklı süreçler referans alıp dersin amacını kavramsallaştırarak başlamaktadır. İkinci alt başlıkta ise ETSA-UPV'de verilen birinci sınıf dersinde kullanılan temel yöntem tarif edilmektedir. Dersin gelişimi analiz edilirken, ortaya çıkan sorunların tespit edilmesi

ve sonuçların iyileştirilmesi için önerilen değişiklikler ele alınmaktadır. Standart öğretim metodu yatay bir sürece dayanır. Bu metodun dizilimi; teori, bir projenin mimari analizi ve sentezi şeklindedir. Bu süreç birinci sınıf öğrencilerinde öğrenilmiş olan teorik bilgiyi proje kısmına aktarırken büyük soru işaretlerini de beraberinde getirir. Bu sebeple, derste David Kolb tarafından çalışılmış *the cycle of circular learning* (öğrenme döngüsü) sürdürülmüştür. Ek olarak, kademelerin her bireyin kişisel özelliklerine uygun olarak düzenlendiği ve anlama-algılama uygulamalarının kombine edildiği bir ortamda bir dizi yaratıcı uygulama kullanılmıştır.

Yeni öğretim yaklaşımının temel amacı göz önünde bulundurularak, metnin üçüncü bölümü çeşitli aktivitelerin tanımlarını içermektedir. Önerilen farklı etkinlikler analiz evresi ile proje evreleri arasındaki bilgi aktarımını yapabilecek bir metottan yola çıkmaktadır. *Learning by doing*; (yaparak öğrenme) felsefesine dayalı, düşünme, somutlaştırma ve deneyimleme gibi yaratıcı uygulamaların gerçekleştirilmesi iki temel araç ile mümkün olmaktadır; el ile çizim ve üç boyutlu maket yapımı. Bu iki araç ve uygulamalar aracılığı ile öğrencide bir üçüncü hedefe varılması amaçlanmaktadır: büyük bir yaratıcı kapasite oluşturmak, mekânsal algıyı geliştirmek ve kullanılan materyalin mekân algısını ve tanımı nasıl etkilediğini bilmek. Uygulama metodu elleri kullanarak düşünmek, mekânı bükmek, mekânda yerleşmek ve mekânı inşa etmeyi içermektedir, bulgular 2017-2018 akademik yılında elde edilmiş sonuçlarla bir karşılaştırma yapılarak analiz edilmiştir.

Sonuç olarak, bahsi geçen bilgilerin ışığında öğrencilere uygulanan anketler, su sonuçlara yol açtı; birinci sınıf mimari tasarım projelerinde yaratıcı etkinliklerin uygulanması öğrencilerin işlerinde önemli bir gelişme görülmesini ve teorik bilgilerin daha kolay sindirilmesini sağlamıştır. Bu teorilerin sadece incelenip analiz edebilecek fikirler olarak değil yaratım sürecinin birer aracı olarak anlaşılmasına yardımcı olmuştur. Diğer yandan maket yapımı içgüdüsel öğrenmeye fayda sağlamış, öğrencilerin yapım sürecinde eylemlerinin sonuçlarını görmelerini sağlamıştır. Ve ayrıca, elle çizim ile geliştirilen etkinlikler çizilmiş olan planın hem değerini ortaya çıkartmış hem de sonuçlara ve düzeltmelere dikkat etmelerini sağlamıştır. Mimarlığı el ile deneyimlemek, öğrencilerin mimari projenin başrol oyuncusunun mekân olduğunu anlamasıyla, dolaylı olarak derinlemesine düşünme eylemini kapsamaktadır.

TEACHING ARCHITECTURAL DESIGN THROUGH CREATIVE PRACTICES

This article provides investigation details of teaching architectural design as a fundamental part of the architectural discipline. This line of research delves into learning about the most creative action of the architectural production process, design, taking into account that creativity must be complemented by disciplinary training that combines both theoretical knowledge and practical skills. Considering these observations, this text provides information about the experience accomplished by four teachers from the School of Architecture of the *Universitat Politècnica de València* (ETSA-UPV) on the subject of Design Studio 1 for the first-year studies. The propaedeutic character of this subject shows additional difficulties given the complexity of introducing the students into the field of architectural design.

The article begins with a description of the historical background of teaching architecture, contextualizing the object of study and also the different processes used as reference during the accomplishment of the teaching experience. The second section includes a description of basic methodology of the specific case of the first-year subject taught in the ETSA-UPV. It provides analysis of its evolution, detection of the problems and suggested variations of the learning method in order to improve the final results. The canonical teaching method is based on a linear process starting with the theory, followed by architectural analysis, finishing with project synthesis, which generates important doubts for the first-year students when implementing the theory in the project phase. Therefore, resuming the cycle of circular learning studied by David Kolb, several creative practices have been introduced into the subject, where the order of the stages depends on the particular characteristics of each individual and learning takes place by combining practices of perception and comprehension.

Keeping in mind the main goal of the new teaching approach, the third part of the text includes a description of several activities. They are designed using a methodology capable to promote the transfer of knowledge between the analysis phase and the project phase. Creative practices are based on the learning by doing process, where reflection, conceptualization and experimentation are carried out with two basic tools: hand drawing and the three-dimensional model. With the practices and these two manual tools we seek a triple objective for students: to acquire a greater creative capacity, to develop spatial vision and to recognize how materiality affects the definition and perception of space. The methodology of the practices includes thinking with the hands, folding the space, inhabiting the space and building the space, and it is compared to the results obtained during the academic year 2017-2018.

Finally, these results, together with the surveys completed by the students, lead to following conclusions: introducing creative activities in the first year of architectural design has shown a substantial improvement of the work carried out by students and has allowed settling the acquired theoretical knowledge. It helps to understand it not only as concepts that can be observed and analysed in reality, but also as tools of the creative process itself. On the one hand, the construction of models supports intuitive learning, allowing the students to directly recognize the consequences of their actions during the constructive process and its implications in the final result. On the other hand, the activities developed using hand drawing techniques confirm the value of the drawn plans as a tool to define the results and verify their correctness. Experiencing architecture with the hands implicitly involves a work of reflection through which the students are able to understand that space is the actual key element of the architectural project.

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