Vilanova's Porto. Didactic Experiments on Drawing

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Abstract. This communication aims to present and discuss the results of a didactic experiment developed in the first year of the master's degree in architecture at the Faculty of Architecture of the University of Porto (2022–2023), in which hand drawing—both freehand and technical—was explored as a tool for investigation, knowledge acquisition, and spatial skill development.

Building upon the significant collection of drawings created in 1833 by Joaquim Vilanova—an artist and professor at the "Academia Politécnica do Porto"—the curricular units of "Geometry and Architecture" and "Drawing 1", in collaboration with researchers from the school, presented students with a challenge aimed at reinforcing the complementarity between different architectural graphic expressions.

In a school where hand drawing remains fundamental and the teaching of architecture relies on the structural link between drawing and design, this experiment had a dual objective: to revisit, in the context of pedagogical drawing practices, the graphic work of a renowned 19th-century artist and to promote the relationship between curricular units to broaden and articulate the teaching of graphic expression.

Keywords: Joaquim Vilanova · Drawing · Geometry

1 Introduction

The celebration of the 190th anniversary of the drawing album "Edifícios do Porto em 1833" [1], created by Joaquim Vilanova, served as the inspiration for a didactic experiment on drawing—freehand and technical—that brought together the curricular units of "Geometry and Architecture" and "Drawing 1", both from the first year of the master's degree in architecture at the Faculty of Architecture of the University of Porto.

In a school where hand drawing remains fundamental, and the teaching of architecture relies on the structural link between drawing and design, this challenge had as its main objectives:

– to revisit, in the context of pedagogical drawing practices, the graphic work of a renowned artist from academia and the 19th-century city of Porto;

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– to promote the relationship between curricular units to broaden and articulate the teaching of graphic expression;
– to cultivate among students an interest in the history of the city and architectural research, emphasising its value as an operative tool for design and as a rich resource of available content for continuous reinterpretation.

2 Vilanova Drawings

Fig. 1. Left: "Casa dos Fidalgos da Fábrica" drawing by Vilanova, Porto, 1833. Right: "Casa da Câmara" drawing by Vilanova, Porto, 1833. Source: © *Biblioteca Municipal do Porto.*

Joaquim Cardoso Vitória Vilanova (1792/93–1850) is the author of the famous 102 small ink wash paintings, commissioned by João Nogueira Gandra (1788–1858), which are now held in the custody of "Biblioteca Municipal do Porto" under the title "Edifícios do Porto em 1833" [2] (see Fig. 1).

The criteria that led to the selection of the works that make up this book covering the typological diversity of the city's buildings, from the "Academia" to the "Torre dos Clérigos", are unknown [3]. Alphabetically ordered and numbered, the ink wash paintings depict some of the city's main sights: chapels, convents, churches, monasteries, hospitals, houses, palaces, and urban spaces. Only one represents an interior space; all the others are exterior representations.

Initially, the identification of the buildings and spaces depicted by Joaquim Vilanova was carried out using Google Earth based on current aerial photography (2023). The disappearance of some buildings necessitated the use of contemporary cartography to create drawings, with Teles Ferreira's 1892 map being selected. This raster map was georeferenced in the QGIS software using key points of the city's built environment that remain unchanged. This allowed the overlay of the 1892 city with the current built fabric and the identification of the locations of the depicted buildings (see Fig. 2). Teles Ferreira's map was the first commissioned by the Porto City Council with the aim of supporting the urban planning of the city. It had been requested since the mid-19th century. This map is indeed an accurate survey based on scientific principles. It was conducted at a 1:500 scale, allowing for the first representation of the cadaster and the different types of city blocks at that time [4].

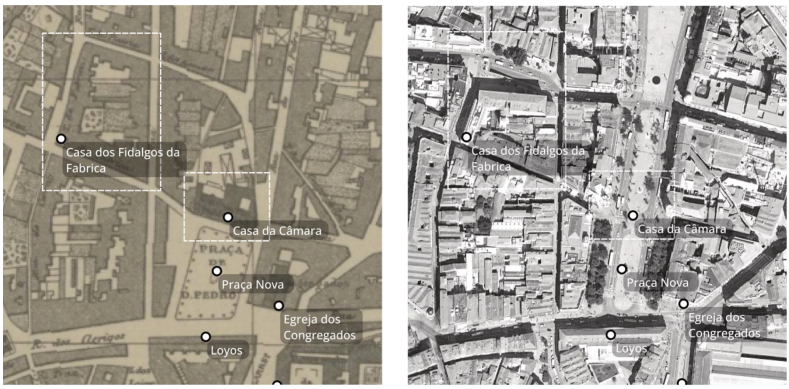

Fig. 2. Teles Ferreira's Map, Porto, 1892, and Google Earth aerial photograph with areas of interest marked in white dashed lines, Porto, 2023. Source: *Authors' drawing.*

The progress and cultural context at the time of the execution of the ink wash paintings dictated the transformation of the urban fabric, with significant heritage losses in the city center, which are inexplicable by today's preservation criteria. Nearly a dozen and half buildings were demolished and/or significantly altered, and their image was captured by Vilanova's drawings in the first half of the 1800s, a period predating the first photographs. In some cases, current toponyms indicate the previous occupation of these places. For example, the disappeared "São Bento de Avé Maria" convent would give way to the modern railway station of the same name.

It is well-known and studied that a significant number of transformations would occur in conventual enclosures and religious buildings [5]. However, in addition to these, other civil buildings were also demolished in the name of progress. The opening of the boulevard culminating in the new City Hall, the "Avenida das Nações Aliadas" (1916), and the creation of the "Hotel Infante Sagres" (1943–51) by the architect Rogério de Azevedo on "Praça Filipa Lencastre" [6] would eventually lead to the demolition of the two old 18th-century houses [7] selected for the academic exercise: the Monteiro Moreira house, which housed the City Hall from 1819 in the former "Praça Nova", and the "Casa dos Fidalgos da Fábrica" next to the street of the same name. The existence of two photographs capturing these disappeared buildings from the late 19th and early 20th centuries allowed for exercises based on a comparison with the drawings (see Fig. 3).

Fig. 3. Left: Photograph of the "Casa dos Fidalgos da Fábrica", Porto, 1933–38, by Guilherme Barreiros. Source: © *Arquivo Municipal do Porto*. Right: Photograph of the "Casa da Câmara", Porto, year and author unknown. Source: *Monumentos Desaparecidos Blogspot*.

3 Let's Talk About Geometry and Drawings

"Geometry and Architecture" is a first-year curricular unit aimed at developing students' spatial and geometric reasoning by mastering different systems for interpreting, conceiving, and representing three-dimensional shapes. Currently, its syllabus is structured into two parts: one analogical and the other digital. The first—analogical—is dedicated to traditional representation methods where hand drawing is emphasised as the primary tool for assisting geometrical thinking. The second—digital—was introduced in the 2015/16 academic year to update the curriculum at a time when the practice of architecture proved to be inseparable from the use of computers. Thus, it is focused on three-dimensional modelling as a method to address more intricate geometry topics impacting architectural design practice [8].

The course is attended by approximately 200 students who are organised into seven groups of around 28 individuals each. The course consists of a weekly 1.5-h theoretical class complemented by a 2-h practical lesson where students can test and acquaint themselves with the topics discussed. While in the first part of the program, individual work is encouraged through short-duration practical exercises, typically ranging from one to three classes, in the second part, students are tasked with developing a more comprehensive exercise that usually spans over seven classes.

The didactic experiment that used Joaquim Vilanova's small ink wash paintings as a reference occurred in the initial phase of the course, involving the completion of an individual hand-drawn exercise. Given the particular features of Vilanova's drawings —frontal representations of buildings— the instructors considered it more pertinent to frame the exercise within the theme of Perspective, using it to explore the sub-topic of perspective restitution specifically.

As Mario Docci and Diego Maestri [9] refer, perspective restitution means reconsidering, in reverse, the steps of the process by which the perspective representation of an object is obtained from orthogonal projections. In this context, it involves determining within a given perspective image—whether a geometrically precise drawing or a photograph—all the elements that reconstruct the projection system, such as vanishing points,

the horizon line, the centre of projection, the distance from the observer to the picture plane, and the measuring points, to achieve the real dimensions of the object.

Therefore, by focusing on one of the early 20th-century photographs (see Fig. 3) depicting two demolished historical buildings of Porto, students were asked to reconstruct its frontal elevation, somehow comparable to the illustration by Villanova. In addition to presupposing the student's firm grasp of the perspective projection principles, exercises on perspective restitution emphasise the operative role of geometry as the tool that allows one to decipher the constructive structure of an image and to manipulate it with rigour and criteria—either analogically or digitally—to obtain precise data from it, such as the object's orthogonal projections and its measurements, in a process akin to elementary photogrammetry.

With this objective in mind, the exercise was proposed to the first-year students. Based on the mentioned photographs, the first step was determining the perspective orientation elements, followed by the building's facade rotation onto the picture plane. To do this, students used Teles Ferreira's 1:500 cartography from 1892, where they retrieved the length of the facade's original building. This small piece of information was fundamental for them to carry out the exercise rigorously and obtain the orthogonal projection of the building elevation with control over measurement and scale. The process involved two stages, each corresponding to a different drawing (see Fig. 4). The first involved the execution of the overall restitution of the building's facade obtained directly from the perspective drawings made on the photograph. The second sought to rationalise the metric and geometric proportions system of the perspective restitution drawing to correct any natural imperfections resulting from its manual execution, regulating it and making it more consistent.

Although at first glance, the two case studies seemed equivalent in terms of determining the geometric structure of the perspective and consequently obtaining the real size of the facade and its architectural composition, in reality, the photograph of "Casa da Câmara" proved to be slightly more straightforward and less complex than that of "Casa da Fábrica dos Fidalgos". The smaller dimension of the facade, the more noble and detailed character of its architectural design, and especially the higher viewpoint from which the photograph was captured are the factors that contributed to it revealing more suitable for the exercise, yielding the most positive results from the students focusing on this example.

In the end, the students obtained a frontal drawing of the facade, which they had to carefully calibrate in its graphic expression, making decisions about what and how much detail to include to portray the architectural character of the building accurately. Given the similarity that the students' final drawings share with Vilanova's, it was thus possible to compare the two representations and assess the graphic coherence of each one regarding the composition, metrics and proportion of the drawn elements.

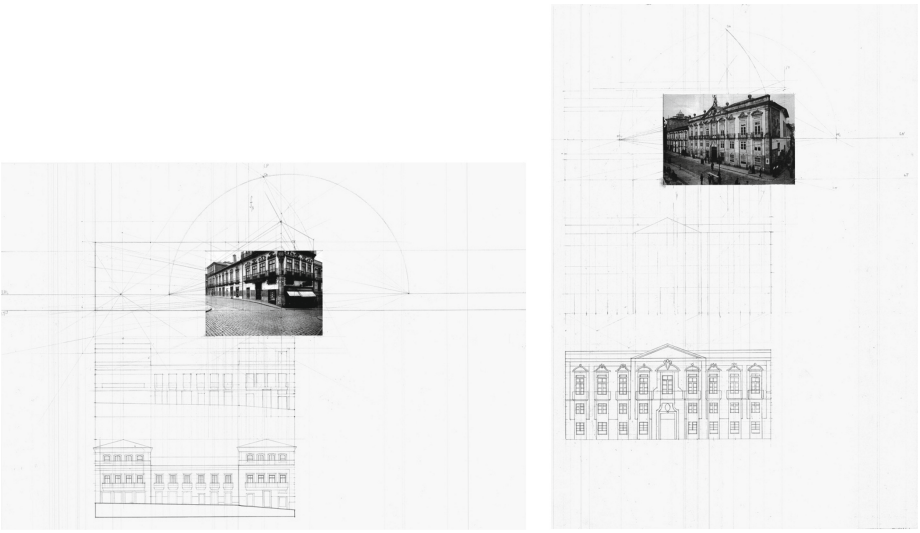

Fig. 4. Left: Perspective Restitution of "Casa dos Fidalgos da Fábrica", Bernardo Costa, 2023. Right: Perspective Restitution of "Casa da Câmara", Rafael Loureiro, 2023.

4 Let's Talk About Drawing and Drawings

The displayed drawings must be understood as possibilities of response to requests of a kaleidoscopic diversity. They address specific questions from the "Drawing 1" curricular unit syllabus, which requests, among other topics, freehand drawing based on real-life models. Moreover, the specific theme to which they respond aims to align with the curricular units of History and Geometry, revolving around the context of "Porto by Vilanova".

Thus, drawings were drawn from reality, using "schizzo" and "bozzetto" (see Fig. 5) as a means of graphical recording. We are far from Vilanova's descriptive drawings – slow in their implementation, careful in appearance and, indeed, the result of a "montage" subsequent to any preliminary drawing register.

The students' drawings are evidence of this preliminary drawing register. Considering that the drawings are produced according to the "current model", they naturally represent the actual reality. They do not replicate "Porto de Vilanova" buildings. Nevertheless, they focus on the same places in "today's" Porto.

The "schizzo" drawings are made freely. They constitute first attempts and allow for a first recognition of space and its elements. They are spontaneous drawings par excellence, they are drawn fast and carried out with few resources. In these small-format notes (approximately A6 size), one can sense the intimate relationship between the draftsman and the drawing tools that provide quick registration. These are 'a la prima' drawings without corrections, executed with various instruments such as pen, India ink marker, and brush. While the pen and marker may afford precision in shaping and describing particularities of the space, these are never pursued. The student engages in the swift and synthetic pursuit of a first impression of the 'place'. These are not

drawings that dwell on reflective or recognition-based aspects of the space. They are drawings aimed at approximating the space. It marks the student's initial encounter with the location. The cloudy character, coupled with the high contrast resulting from the interplay between the whiteness of the paper and the 'inks' used, contributes to a reading of space that merges morphologies in favor of holistic understanding.

What is significant in the reflection on these drawings is not their descriptive, or even the enumeration of architectural elements, but rather the empathy with the place and how, synthetically, urban polysemy can be recorded.

Fig. 5. Left: "Schizzo" by Pietro Alfano, 2023. Right: "Bozzetto" by Nicole Guimarães, 2023. (Drawings developed under the didactic guidance of Prof. Jorge Abade)

In a second phase of space drawing, a more lengthy approach, the pencil takes precedence as the recording medium (see Fig. 5). The representation carried out by the students begins to reflect the attention given to some elements of the space, particularly the clarification of the buildings' heights, the number of floors, the windows, and even the rhythm created by the lighting lamps. Additionally, there's a noticeable concern for the "correction" of the perspective representation achieved through a prior structuring of the drawing. Furthermore, emphasis is placed on the projection of shadows and the intensity and variation of bright and dark values that, to some extent, can clarify when the drawings were made.

However, the students operate in a recording field quite far from Vilanova's drawing of the "Casa dos Fidalgos da Fábrica".

There's a natural impossibility of drawing, from reality, the "Casa dos Fidalgos da Fábrica". The building no longer exists. For the students, there remains only curiosity in speculating about this possibility. Not surprisingly, such a hypothesis would immediately slide into the difficulties the observer would face in distancing themselves enough to encompass the entire dimension of the building. The structure and the variation in levels determine an eventual impossibility of a close reading of an elevation, as presented by Vilanova. The drawing of "Casa dos Fidalgos da Fábrica" appears to be the result of

collected fragments of the whole, certainly from various means, and elaborated in a "studio."

The graphical means and processes used determine their own timeframe for execution. This is a "clean" drawing. A drawing that not only aims to inform but perhaps also to illustrate, almost like a postcard.

5 Conclusions

In general, the results of this didactic experiment have proven to be positive for both the students and the involved curricular units. It was an opportunity to review pedagogical strategies and consider new approaches to the programmatic content from a proactive and comprehensive method of a transdisciplinary nature, considering the value of history in the architect's formation.

It allowed the students to refine their critical sense regarding the geometric construction underlying architectural images from different times. Experimenting with distinct graphic explorations on a specific topic was undoubtedly enriching. Above all, it revealed the importance that drawing can have, in its different dimensions, as an operative instrument for architectural research and practices.

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