

# NULLA DIES SINE LINEA. RESEARCH BY DRAWING IN THE TEACHING OF THEORY OF ARCHITECTURE

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## Resumo / summary:

"Nulla dies sine linea" (*nenhum dia sem traçar uma linha*) é uma máxima de Viollet-le Duc que Fernando Távora citava a propósito da educação dos estudantes de arquitectura. Sendo indiscutível para o ensino do Projeto, ela é de igual modo válida para o ensino da Teoria de Arquitectura.

Entender o papel do Arquitecto numa filosofia *Vitruviana*, como um especialista generalista (um técnico/artista que sabe relacionar-se com outros técnicos e outros artistas), implica uma ideia de educação integral (mas não especializada) do arquitecto, na convicção que este é o único profissional que, pela abrangência da sua formação, pode organizar em obra a síntese de todos os seus elementos.

O Desenho, entendido como capacidade de criar e manipular imagens que expressem ideias, é um instrumento que permite (em articulação com a escrita) relacionar diferentes áreas de conhecimento: história, estética, funcionalidade, construção, contexto físico e cultural, planeamento urbano, valores históricos e patrimoniais, sustentabilidade ambiental, etc. Assim, os estudantes de arquitectura devem ser ensinados a utilizar o desenho como instrumento de investigação interdisciplinar; mas esta *investigação pelo desenho* não deve ser confundida com mera representação: a reflexão sobre os conceitos deve sempre ser critério para a avaliação das imagens produzidas.

Este tipo de trabalho decorre obrigatoriamente nas aulas de Projeto, mas também pode ser desenvolvido no ensino da Teoria da Arquitectura, onde os estudantes podem desenvolver trabalho gráfico/analítico como método de investigação e como suporte para a análise de edifícios e/ou comunicação de ideias.

Neste artigo serão apresentados exemplos de trabalhos realizados em disciplinas das áreas da Teoria e da História da Arquitectura, onde os alunos articulam a abordagem de diferentes questões (relação com o contexto físico e cultural, geometria, significado, funcionalidade, tectónica, etc) em trabalhos onde a relação entre texto e imagem (desenhos, fotos e diagramas) é fundamental para a comunicação das ideias.

"Nulla dies sine linea" (no day without drawing a line) is a dictum of Viollet-le Duc that Fernando Távora quoted, regarding the education of students of architecture. Being undisputed for Architectural Design classes, it is equally valid for the teaching of Theory of Architecture.

Understanding the role of the architect in a Vitruvian philosophy, as a *specialist generalist* (a technician/artist who knows how to relate with other technicians and other artists), implies an idea of comprehensive education (not specialized) of the architecture student, so that he can become a professional who, by the scope of his training, can organize the synthesis of all the elements that have to converge in the process of architectural design. Drawing, understood as the ability to create and manipulate images that express ideas, is an instrument that allows us (in conjunction with writing) to relate different areas of knowledge, and should be taught as a tool for interdisciplinary research, both in the Studio classes and in theoretical units.

Architecture students should be taught to use images as tools for interdisciplinary research, but this *research by drawing* should not be confused with mere representation: the consideration of the concepts implied should always be a criterion for the evaluation of the images produced.

This kind of work takes place in the Design classes, but can also be developed in the teaching of Theory, where students can develop analytical research as a support for the communication of ideas.

This paper will show examples of the work done in classes of Theory and History of Architecture, where students articulate the study of different themes (physical and cultural context, geometry, function, tectonics, etc.) and where the relationship between text and image (drawings, photos and diagrams) is crucial for the communication of ideas.

## palavras-chave / key words:

Desenho, Teoria, Investigação, Ensino, Arquitectura

Drawing, Theory, Research, Education, Architecture

What is the specific scientific field of Architecture?

In the last decades, triggered by the increasing number of Master and PhD thesis developed in this area of knowledge, this question has been posed over and over again.

*Architecture* is a very ancient activity with a long tradition of research but has a relatively recent scientific status; there is little tradition in the University Canon in promoting, accepting and validating architectural research. It is much easier to define architectural studies as scientific when they are being developed on the edges of other related fields: construction, sociology, history, philosophy, urban and territorial planning, environmental sustainability, etc. Most of these research fields have a long scientific tradition, so their themes, methods and results are easily recognizable as academic; but I believe that a thematic research that only focuses on one of these fields of investigation cannot be called Architectural Research.

We can establish a general consensus on what is the main role of an architect: the response<sup>1</sup> to a programmatic necessity,<sup>2</sup> proposing a particular form and space<sup>3</sup> to a given site.<sup>4</sup> In most cases, architectural practice has to consider **simultaneously** questions related to aesthetics, physical and cultural context, patrimonial values, functionality, accessibility, individual and collective behaviour, stability, acoustics, energy efficiency, etc. So, Architectural Research must be an activity in which different fields of knowledge are related, and not a thematic research in which the scholar studies the problematics of a single scientific area.

Drawing, understood as the ability to create and manipulate images that express ideas, is the main instrument that allows architectural practice to relate different knowledge areas. So, architects must be experts in *research by drawing*; that should be the aim of any architectural school, if you believe in the Vitruvian<sup>5</sup> conception of the *education of the architect*.

## THE GENERIC SPECIALIST IN THE PRESENT DAYS

In “*De architectis instituendis*”, first book of *De Architectura Libri Decem*, Vitruvius explained that the architect, besides the knowledge of theory and practice of architecture (and of its meaning and its significant), should know how to write and draw, be an expert on geometry, optics and arithmetics, have good knowledge of history and philosophy, be acquainted with music and know a little bit about medicine, law and astrology. This holistic conception has always been one of the basic principles of the education of the architect in the western society.

Because the *barbaric of specialization* (ORTEGA Y GASSET, 1937) is still very dangerous to the architect, the Vitruvian concept of teaching is still valid: the architect must be a **generic specialist** (someone that knows a little about many things) before he decides if he wants to embrace one or more areas of specialization.<sup>6</sup>

Today this is harder to achieve, because the architectural field is much more complex: a generic specialist must still know theory and practice of architecture (and urbanism), history, geometry, philosophy and law, and must also be capable of understanding basic concepts related to engineering (stability, thermal behaviour, acoustics), ecology, art, photography, anthropology, economy and public relations; and, of course, he must still know how to write and how to draw (by hand and with CAD systems).

Most architectural schools try to address nearly every one of these areas in the syllabus, but Studio classes have always been considered nuclear in the structure of the course. Throughout the last century, architectural schools left the “Beaux-Arts” paradigm of teaching classical drawing and composition for a modern approach, inspired by the Bauhaus<sup>7</sup> school: a new way of seeing the education of the architect, with emphasis on laboratorial practice, that aimed to promote a link between craftsmen’s work sensibility and industrial design technique. This method reunited scientific and artistic education, and brought the “Beaux-

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<sup>1</sup> One may disagree in whether it is an artistic or technical response, but that is not relevant for this definition.

<sup>2</sup> This programmatic necessity may be public, private or even be created by the architect as an abstract exercise, but that does not mean that we can consider that architectural activity can exist without a related programmatic intention...

<sup>3</sup> The relation between architecture and form can be more or less connected to the binomial construction/technology; an architectural proposal can even be elaborated without intention of construction, but it always implies some intention in the relationship between form and space.

<sup>4</sup> Even in abstract exercises, without intention of construction, the minimum features of an imaginary site are always implied in the options of the architect.

<sup>5</sup> Related to the theories of the roman architect Vitruvius, author of *De Architectura Libri Decem*, the first known treaty of Architecture (written in the 1<sup>st</sup>. Century a. C.).

<sup>6</sup> On this subject, see also GIEDION (1941, p. 38-44).

<sup>7</sup> The bibliography on the subject is vast... for a small synthesis, I suggest the writings of Walter Gropius compiled in *Scope of Total Architecture* (GROPIUS, 1956).

Arts" tradition of the "Atelier" a new sense: students working in laboratory conditions, with the supervision of the masters/professors, trying to find out their own personal method to conceive, draw and construct buildings in the modern spirit, responding to current technical, theoretical and artistic concerns. This idea has survived to the present day, and represents the paradigm of most of the contemporary teaching strategy in Studio classes.

### ***RESEARCH BY DRAWING IN THE STUDIO***

The architect must be someone that *creates ideas about buildings and buildings that are ideas* (WIGLEY, 2005). So, we should not confuse *research by drawing* with representation; even though the ability to create good images is very useful for a student or an architect, the concepts behind the design should always be considered more important than the quality of the image in itself.

*Communication drawings*, the images architects produce to explain their work to others (to the client, to the engineers, to the construction workers, to readers of Architectural Press, etc...) are not the most important component of architectural research. These are just a part of this field: 2D or 3D images, made with or without computers, are useful to the architect with different purposes besides the communication with others. In the design process, architects and students produce *research drawings*, sketches done with the only purpose of searching for an idea or testing a solution for the problem they are facing. These are not communication drawings because they are not made with the intention of presentation to others: sometimes they are not complete or carefully made (it can happen that nobody else can understand them, except the author), but they can still be very valuable in the process of architectural design.

Sometimes, this *research drawings* lead to images that explain the concepts (the ideas that justify the options of design), beyond the actual form of the building that they are representing. This is another kind of architectural means of research in the process of design: *analytical drawing*. When those drawings become useful to explain their ideas, architects (or students) can use them as *communication images*.

The ability to *research by drawing*, the capacity to create and/or manipulate images that express ideas (*research or analytical drawings and communication images*) is the most useful instrument of an architect, as it allows the relating of different areas of knowledge: history, aesthetics, functionality, construction, cultural and physical context, urban planning, historical and patrimonial values, environmental sustainability, etc...

Thus, the architecture students are taught to use images as tools for interdisciplinary research in the Studio classes. Being the centre of architectural teaching, the Studio is the place where the information of every one of the different areas in the curriculum becomes operative. But relating all this knowledge to Studio exercises was never easy; so, why not use these acquired skills in other Curricular Units?

Can we try *research by drawing* outside the Studio?

### ***RESEARCH BY DRAWING OUTSIDE THE STUDIO.***

I believe that we should not leave to Studio classes all the responsibility in making the synthesis of all the knowledge that scholars gain from all the different subjects they study. My experience of teaching theoretical and historical subjects in architectural courses has shown me that students can address various fields of knowledge (communication values, in text and images, relationship between building and context, patrimonial values, functionality, geometry, individual and collective behaviour, etc.) when they produce analytical work while studying the ideas and the works of famous architects. In the process of studying famous works by Palladio, Brunelleschi or Corbusier, students can make a synthesis of what they have learnt, not only by writing a traditional "paper", but also by presenting images (drawings, photos and diagrams) that support their ideas and explain them in a visual way. This kind of work makes students understand the process of design of the author they are studying in a reverse order: they start with an analysis of the final drawings and try to understand the ideas behind them.

This awareness of the utility to focus the work done in theoretical subjects on *research by drawing* was initiated in 1999, when I started my teaching career in the Faculty of Architecture of the University of Porto, as an assistant of Professor Manuel Botelho in Methods and Languages of Contemporary Architecture, and increased in the following year, when I was the assistant of Professor Domingos Tavares in History of Architecture of the Modern Period. Working with Botelho and Domingos I could learn from their experience in supervising students' practical work and understand the importance of analytical drawing in theoretical research. It was rewarding to notice that students approached this kind of work in a very enthusiastic way, and not only comprehended better what they read in books and magazines, but also seemed to be able to

understand the way these contents they learned could be useful in their own Studio exercises (Figure 01). Since 2001, in the School of Architecture of the University of Minho, I have been responsible for several courses in the area of Theory, and have created many practical exercises that have one thing in common: the idea that Theory of Architecture can and should be both an autonomous field of thinking and a tool to support the practice of Design.

In the attempt to accomplish this notion, most of my exercises demand the use of *analytical drawing*, with very direct relationship between text and image. Most of all, students should understand the need to use images as instruments of analysis and communication. In this kind of work, text and image must be complementary, as their interactions should be essential for the understanding of the ideas implied: the image should not be mere illustration and the text should not have an autonomous discourse (Figure 02).

This kind of work takes a lot of time, and needs to be supervised by a professor on a weekly basis, as in a Studio exercise. But it was possible to do this in theoretical subjects because in most Portuguese Architecture Schools the Curricular Units of Theory and History of Architecture had both theoretical and practical classes.

However, in the last 10 years, based on a restricted understanding of the “Bologna Process”, most Schools of Architecture compressed their curriculum to 20/25 hours a week. With the exception of the Studio classes, where the professor can still have long hours of dialogue with the students, every other subject in the syllabus had the number of weekly hours reduced to a minimum of subsistence and was transformed into an “auditorium subject”, with little time for the students to interact with the professor. So, as a result of this “Bologna compression”, it is now difficult to proceed with this line of work in theoretical classes.

For the last four years I’ve been responsible for Theory III, one of the post-Bologna-two-hour-a-week-auditorium-subjects, with 60 students and little time to interact with them. But I still believe that in a Theory class the student should be assessed by his ability to think, and should have a chance to demonstrate this skill in practical work. So, I’ve been experimenting with different approaches to induce mixed fields of research; mainly, using the work done by the students in Studio classes as a subject for theoretical research. In Theory III (in 2009-10) I asked the students to do an exercise in which two colleagues had to make a critical approach to a previous Studio work that they both shared, comparing their ideas on an analytical study and on a multimedia presentation (Figure 03 and 04).

I was pleased with some of the results, although the limitations of time made it very difficult to give the adequate support to the students; this experience made me realize that this kind of exercise, supported by Studio work, was very useful to maintain the practice of *research by drawing* in post-Bologna conditions. Nevertheless, the experience revealed that it is difficult for the students to theorise when the subject is their own design and that they seem to produce richer and more useful work when they are studying the buildings of famous architects: because there is a theoretical background to gather information from, but also because the subjects of study are much richer and complex.

In the first semester of the present year, I tried a different approach: the work of the students of Theory III must relate the themes of my theoretical lessons with the work that is being done in the Studio classes, at the same time. This is useful for the Design work, but presents another difficulty for my purposes: students find it difficult to design and analyse their project at the same time.

This kind of challenges is particularly difficult to settle when one has 60 students and little time to interact with them. However, in the last three years, I had the opportunity of testing these teaching methods in better conditions. Being responsible for “Theory and Treaties”, in the first semester of the fourth year of our Architectural course, I have 3 hours of lessons per week with a class of 20/25 students, which permits a different level of interaction with the teacher. Besides, there is a very tight relation between the Curricular Units of Studio (where students are asked to draw a project of reuse of a pre-existing building of patrimonial value), Seminar (where they learn about theory and practice of rehabilitation) and Theory and Treaties (where they address the possible relations between the classical and contemporary theory of architecture). So, I have the opportunity to maintain a tight collaboration with my colleagues that teach in the other two Curricular Units, sharing a common goal.

After a first exercise in which students compared ancient treaties with the writings of architects from the 20th or 21st century (Figure 05), they were asked to do a *prospective memory* (Figures 06 and 07) of the exercise they were doing for Studio, clarifying their position on the contemporary debate on patrimony rehabilitation, explaining the options they made and assuming the influences on their work. This exercise started in the middle of the semester and accompanied both the Studio work and the Seminar classes (where more practical matters related to the same subject were discussed). So, the students were confronted with the need to address the same problem in three different ways: drawing a project (in Studio) and studying the relation of that project with the theory and practice of rehabilitation, both in Seminar (where they had to address practical questions of construction) and in Theory and Treaties (where they were free to approach the problem in a more abstract view). This was a very demanding experience, but it was very rewarding, because the students responded to the various solicitations with quality work.

Nevertheless, the experience of the first two years confirmed that it is difficult for the students to theorise when the subject is their own design; mainly because they are not able to design and analyse their project at the same time, but also because it seems to be difficult to look at their own work as a subject of study. They seem to produce richer and more useful work when they are studying the architecture of others. So, in the last year, I have abandoned the *prospective memory* in Theory and Treaties, replacing it with an exercise in which students are asked to compare two famous projects of reuse of pre-existing buildings of patrimonial value. Again, I insisted on the necessity of a very direct relationship between text and image in the communication of their ideas. The results showed once again that this kind of work exercises the ability to create and manipulate images that express ideas, relating concepts of different fields: aesthetics, functionality, construction, cultural and physical context with patrimonial values (Figure 08).

## CONCLUSION

Understanding the role of the architect in a Vitruvian philosophy, as a *specialist generalist* (a technician/artist who knows how to relate with other technicians and other artists) implies an idea of comprehensive education (not specialized) of the architecture student, so that he can become a professional who, by the scope of his training, can organize the synthesis of all the elements that have to converge in the act of creation of architectural work.

Drawing, understood as the ability to create and manipulate images that express ideas, is an instrument that allows us (in conjunction with writing) to relate different areas of knowledge, and should be taught as a tool for interdisciplinary research, both in the Studio classes and in theoretical units.

In an Architectural School, students should be trained in using their ability to create and manipulate images (drawn by hand or with the computer, captured with a camera or reproduced from a magazine) to show what they learn and to express their concepts: their work should show research on representation and communication, but also express ideas related to different areas of the syllabus.

“Nulla dies sine linea” (no day without drawing a line) is a dictum of Viollet-le-Duc that Fernando Távora (2002, p. 86) quoted regarding the education of students of architecture.

Being unquestionable for Studio classes, it is equally valid for the teaching of Theory of Architecture.

### Legenda das imagens / description of the figures:

Figure 1 – Three pages of students' work in History of the Modern Period (2000-2001): analysis of Palladio's Church of S. Giorgio Maggiore by Maria Chicau and analysis of Brunelleschi's Church of San Lorenzo by Sandra Figueiredo.

Figure 2 – Two pages of students' work in Theory of Architecture I (2001-2002): analysis of Corbusier's Chapel of Notre-Dame du Haut in Ronchamp and Monastery of La Tourette in Eveux-sur-Arbresie, by Ana Silva.

Figure 3 – Graphic comparison between two different responses to “Mr. Valery's holiday house” exercise (developed in Project III, 2008-09), from a presentation in Theory III (2009-10) by Marta Machado and Helder Castro.

Figure 4 – Graphic comparison between two different responses to “Mr. Valery's holiday house” exercise (developed in Project III, 2008-09), from a presentation in Theory III (2009-10) by Adriano Silva and Gonçalo Vasconcelos.

Figure 5 – Extract from Filipa Pereira and Ana Moura response to the first exercise in Theory and Treaties, comparing the theory and practice of Palladio and Corbusier, using the famous Colin Rowe analysis from “The mathematics of the ideal villa” (ROWE, 1947).

Figure 6 – *Prospective memory* presented in “Theory and Treaties” by Humberto Neves (original size 60 x 105 cm).

Figure 7 – Extract from the *Prospective memory* presented in “Theory and Treaties”, by Ana Isabel Silva.

Picture 8 – Extract from the analysis of Fernando Távora's “Torre dos 24” presented in “Theory and Treaties” by João Pedro Fonte and Gil Lima.

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### Resumo Biográfico

Eduardo Fernandes; born in 1966, Porto, Portugal.

Architect since 1992 (Faculty of Architecture, University of Porto).

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