

SCHOLAR ARCHITECT 2021

English edition

COORDINATOR: Anda-Ioana SFINTEȘ

TRANSLATED BY Florina TUFESCU

Editura universitară "Ion Mincu"

Bucharest, 2022

This volume is the full translation of **Scholar Architect 2021**

(Romanian edition) ISBN: 978-606-638-231-1

<https://doi.org/10.54508/9786066382311>

First published 2021 (Romanian edition) by Editura universitară "Ion Mincu"

Developed within the framework of the **SCHOLAR ARCHITECT** project

"Ion Mincu" University of Architecture and Urban Planning

www.uauim.ro/cercetare/scholarh

www.facebook.com/scholarhuauim

© COORDINATOR: Anda-Ioana SFINTEȘ

© AUTHORS: Magdalena STĂNCULESCU, Oana Anca ABĂLARU OBANCEA, Anda-Ioana SFINTEȘ, Ionuț ANTON, Ana Daniela ANTON, Andrei MITREA, Dana MILEA, Ioana Elena ZACHARIAS VULTUR, Adrian MOLEAVIN, Marian MOICEANU, Tiberiu FLORESCU, Simona MUNTEANU, Georgică MITRACHE, Horia MOLDOVAN, Melania DULĂMEA, Anca MITRACHE, Niculae GRAMA, Dan MARIN

TRANSLATOR: Florina TUFESCU

DTP: Anda-Ioana SFINTEȘ / Diana RUSU

DESIGN: Anda-Ioana SFINTEȘ / Ioana BOGHIAN-NISTOR / Diana RUSU

COVER IMAGE: Diana RUSU

ISBN 978-606-638-246-5

<https://doi.org/10.54508/9786066382465>

Descrierea CIP a Bibliotecii Naționale a României

Scholar Architect 2021 / coord.: Anda-Ioana Sfinteș;

translated by Florina Tufescu. - English edition. -

București: Editura Universitară "Ion Mincu", 2022

ISBN 978-606-638-246-5

I. Sfinteș, Anda-Ioana (coord.)

II. Tufescu, Florina (trad.)

72

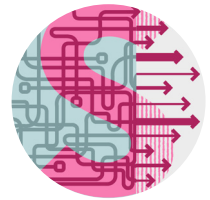
Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0)



This material can be copied and redistributed in any medium or format, with adequate attribution, with no derivatives and only for non-commercial purposes.

© 2022 Editura Universitară "Ion Mincu", Str. Academiei 18-20, sect. 1, București, cod 010014

editura.uauim.ro / Tel.: 40.21.30.77.193



SCHOLAR ARCHITECT

The Romanian edition was developed within
the framework of the project

SCHOLAR ARCHITECT 2021
Improving the quality of research and teaching
in architectural education


Project financed by CNFIS-FDI-2021-0069

The English edition was translated from Romanian within
the framework of the project

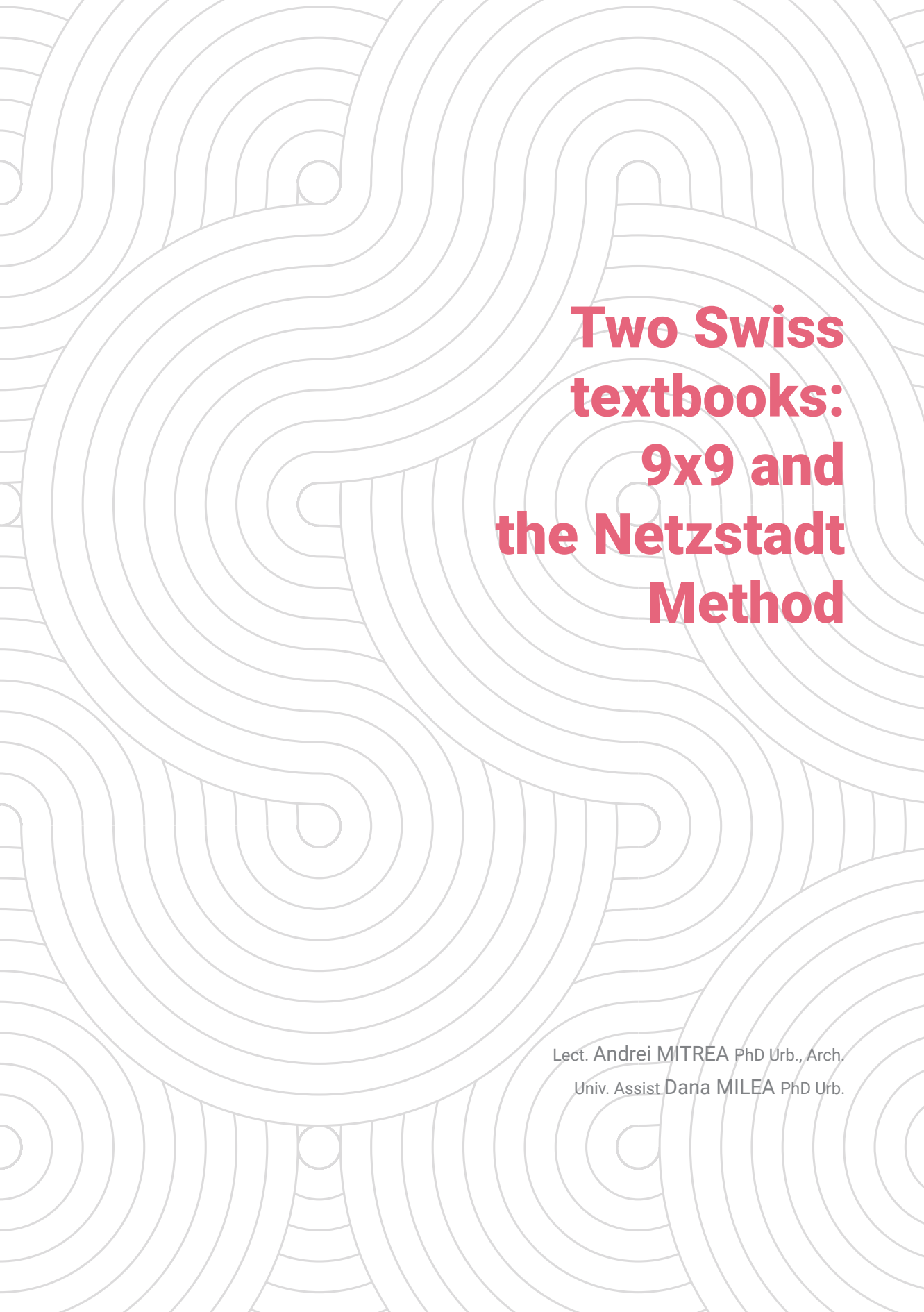
SCHOLAR ARCHITECT 2022
Research and implementation of new trends,
innovations and experiments in architecture and
related fields of education

Project financed by CNFIS-FDI-2022-0075

The Institutional Development Fund, Domain 5:
Improving the quality of teaching, including the
observance of professional and academic ethics



Eidgenössische Technische
Hochschule Zürich (ETH Zürich) is
known as one of the best schools of
architecture in the world. In the
following pages we introduce two
design textbooks created and tested
here over the last three decades.



**Two Swiss
textbooks:
9x9 and
the Netzstadt
Method**

Lect. Andrei MITREA PhD Urb., Arch.
Univ. Assist Dana MILEA PhD Urb.

9x9 Method

<https://doi.org/10.54508/9786066382465.05>

Chronology of the method (Eberle & Aicher, 2018, pp. 28, 50)

The 9x9 method, which we will present below, was born at ETH Zürich¹. Its creation and development are connected to Dietmar Eberle and his design studio “Architecture and Design II”. From 1999, when Eberle became a professor at ETH Zürich, until 2017, he taught architectural design to year II students. Over this period, more than one thousand students, that is between 50 and 70 students per year, were guided by him and his team of assistants.

In 2007, after eight years of experimental studio² work, Eberle, together with Pia Simmendinger, published the textbook *From City to House: A Design Theory* (Eberle & Simmendinger, 2007). The book helps students understand and familiarise themselves with the complex design process by presenting the working method of his studio.

The second-year studio activity continued and, with it, the working method continued to mature. After more than a decade, in 2018, Eberle published another design textbook, this time together with Florian Aicher, which was titled *9x9 – A Method of Design. From City to House Continued* (Eberle & Aicher, 2018). The book maintains the previously established goal while proposing a significantly refined method. A series of exercises with solved examples accompany the theoretical concepts, which are introduced one by one. The complexity of the theoretical grounding and of the practical applications increases gradually, as each set of new information is placed in the context of the already assimilated ones.

¹ Eidgenössische Technische Hochschule Zürich.

² In a school of architecture, the studio is the space where students conduct their design activities, together with a guiding team. In practice, we use the term studio for all the learning and design activities that take place in this space. Thus, it can be an umbrella term for the overlapping of the space with the activities. In our text, studio retains all three meanings, but the readers can easily infer the intended one from the context.

A short description of the method

At ETH Zürich, during the second year, the design studio activities take place over the two semesters. Both the autumn and the spring semester have 13 weeks each. Two days of each week are reserved for studio work. The activities of each semester end with a final project, presented during the last studio session.

At the beginning of each semester, students form 6 large teams, of 8 to 12 people. During the semester, each team is guided by a tutor. Depending on the exercises, the teams are kept or broken up, leaving the students to work in pairs or individually. The workspace is shared, but at the beginning of the year each student is assigned a drawing board that can also be used outside of class time.

All of this is reflected in the structure of the design method, together with three other premises:

1. We need structured architectural education (Eberle & Aicher, 2018, p. 10);
2. Architectural education is both a didactic activity and knowledge summarised into the principles that give birth to architecture (Eberle & Aicher, 2018, p. 14);
3. Architecture starts with defining a shape (Eberle & Aicher, 2018, p. 14).

Defining a shape has at least two dimensions, a physical and a social one. In the end, with any physical architectural object we arrive at the materialisation of the needs of society into a shape. To begin with, let us glance only at the physical dimension of architecture by looking at a building. What do we see?

_From 100 metres, a silhouette;

_From 50 metres, we start to see the geometry and the constructive principles;

_From 10 metres, we notice the materials, the surfaces and the details.

In other words, distance changes how we perceive shape.

Time does the same. For several decades now, we have accepted the fact that durability is a priority and that architecture consumes resources which are already limited. To avoid wasting them, we build things that last over time. Thus, longevity has become a criterion in evaluating the quality of architecture. In other words, the way in which we perceive shapes.

Starting from shape and connecting the two modifiers, distance and time, we end up looking at architecture while taking into account five aspects:

1. Place;
2. Structure;
3. Envelope;
4. Programme (use);
5. Materiality.

These aspects are in fact the five primitives at the basis of the 9x9 method. They guide both the understanding of architecture and the development of the design process. The method is easy to use. Over the course of the year, each primitive is presented to the students. A newly introduced primitive is explored in two steps, the first one dedicated to understanding the notion *per se*, and the second to the study of its relation to the previously explored ones. Since the first primitive in the series, namely place, lacks a predecessor, a total of nine steps is required for the introduction and theoretical grounding of the five parameters. Their succession, referenced by the first 9 in 9x9, can be followed in Fig. 1.

Each of the nine steps unfolds in similar fashion. The subject under discussion is explained in lectures. The students are then given one or several applications which test how architecture is seen through the lens of the primitive or of the relationships it establishes. The exercises are either independent or interrelated, in which case solving some of them conditions the solution of the following ones. In addition, each topic is viewed in relation to a series of nine concepts, meant to stimulate thinking. This accounts for the other 9 of the 9x9 method.

At each step, the applications generate diverse products such as pieces of drawing and writing, photo and video montages, models and public presentations. Solving an exercise always puts the students in the situation of creating at least four products from different categories, which must be harmonised in order to systematically argue for an answer.

The *9x9 – A Method of Design. From City to House Continued* textbook mirrors the structure of the working method. The book is divided into three sections preceded by an introduction. The first section, “Observations”, sets the method in perspective; it provides a succinct description and explains its usefulness.

The second and most substantial section, titled “Method”, explains the working method specific to each step. All nine chapters have the same structure:

1. Each chapter starts with a brief definition of the concept under study. Most often, this includes etymological references and references to key moments from the history of architecture;
2. The definition is followed by an ample exposition which provides the necessary theoretical grounding for understanding the primitive. This exposition contextualises the concept and references other nine concepts whose role is to train critical thinking;

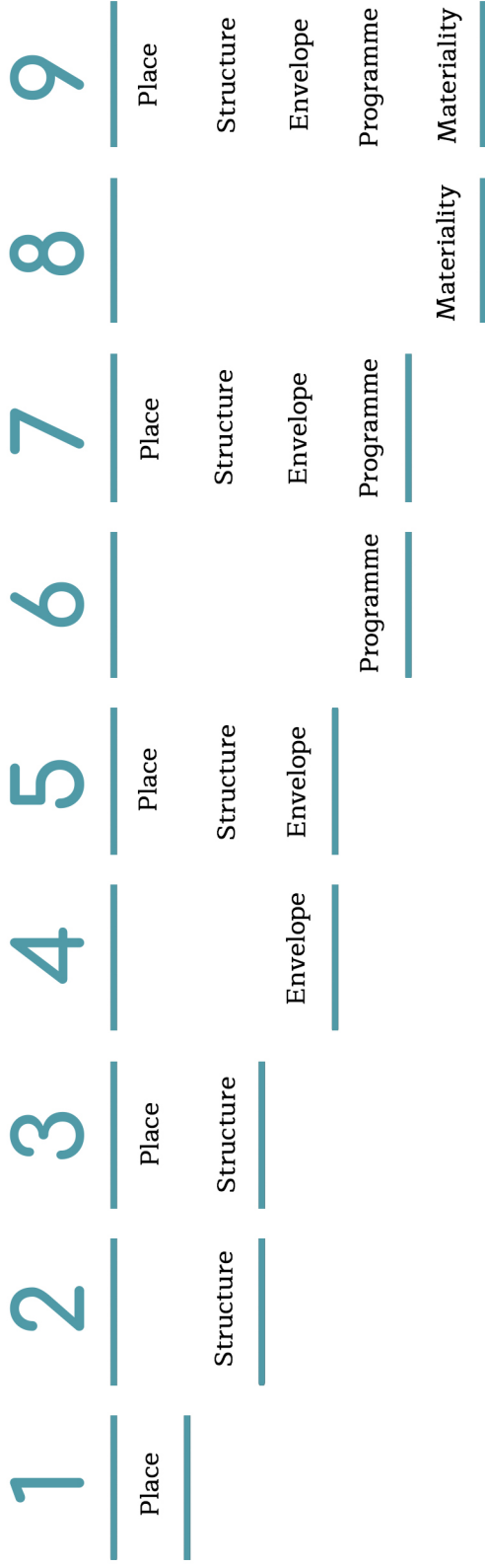


Fig. 1. The succession of the primitives used in the 9x9 method. Eberle & Aicher (2018, p. 54).

3. The key concepts of the theoretical framework are defined in a glossary;

4. The working definition of the concept under study is introduced. This operational definition will then be used in the course of the exercises.

5. The exercises, with their design briefs, are introduced. The brief refers to the following aspects: the problem to be solved and its specific context, the work set-up, the pieces (products) which have to be delivered, the requirements to be followed and the aim of the exercise;

6. The chapter concludes with a series of examples of solutions designed by previous generations of students.

The final section, “Perspectives”, explores the pedagogical implications of the 9x9 method as well as its relation to other disciplines and work techniques.

The structure and the clear explanations as well as the concepts and exercises which are gradually introduced, with an increasing level of complexity, make this textbook a potentially interesting tool for a broad audience. We refer on the one hand to architecture students and to teachers and designers of architecture and, on the other, to non-specialists who have an interest in the field.

Definitions and explanations

As stated above, each of the five primitives is given a book chapter which includes one or several of its definitions. In addition, all nine chapters that explain the method feature a glossary focused on the concepts that are key to a correct understanding of the text. Based on these resources, the five primitives can be briefly explained as follows.

These are the basic remarks about the place:

“[The place is] a site that is singled out, that differentiates itself from the surroundings by being limited and easily defined.”

(Eberle & Aicher, 2018, p. 118)

“Place is created by the context of physical elements such as geography, buildings, exterior spaces, and circulation, and also by societal elements such as social interaction, the economy, and the culture, mentality, and conventions of the inhabitants.”

(Eberle & Aicher, 2018, p. 88)

Subsequently, we have the overview of the structure:

“[Structure is] a system that organizes a limited number of elements according to clear rules.”

(Eberle & Aicher, 2018, p. 118)

“A structure is an arrangement of different elements exhibiting patterns that can be understood as an ordering of the elements amongst each other and as a whole. Areas populated by humans are structured, increasingly complex, and increasingly dense. Cities are highly structured formations. [...] However, individual buildings are also structured; supporting structure and circulation structure both have lasting impacts. [...]

In order to be sustainable, a building structure should allow the use to change, and adapt to the structure of the place.”

(Eberle & Aicher, 2018, p. 140)

This is followed by the comments about the envelope:

“Together with the supporting structure and the circulation, the envelope completes the building structure. It divides interior and exterior space and ensures that the people within have a beneficial environment free of inhospitable climatic influences and all kinds of emissions. A building component with its own volume, the envelope achieves this through the interplay of insulation and retention. The envelope creates the façade, the face of the building, and profoundly marks its relationship to the context.”

(Eberle & Aicher, 2018, p. 218)

Then we have the observations about the programme:

“The word program stems from the Greek πρόγραμμα: Something prescribed. This can mean two things: something that precedes all further statements, or something that mandates how something must proceed. [...]

In today’s architectural practice, the program is the foundation of a design – the spatial allocation program, the Raumprogramm. The client defines the ‘content’ the building project should contain – the architect puts this into a plan.

Program and plan are mutually dependent; they relate to each other reasonably – in the sense of cause and effect – and systematically – in the sense of completeness and free of caprice and chance. Program and plan are rationally connected.”

(Eberle & Aicher, 2018, p. 284)

And finally, the notes about materiality, which is regarded as a feature of the physical object and is closely linked to the material on the surface of the object:

“The materiality of things and the consistency of the elements are first conveyed by the surface of the objects.”

(Eberle & Aicher, 2018, p. 394)

With regard to the material:

“In German, Stoff, from French étoffe: Fabric, cloth, stuff. Related to Latin stuppae: to plug with cotton, mend. Today: Textiles, cloth, content. What is material is – in contrast to spiritual or intellectual – physical, concrete, sensual. Material comes in various aggregates, pure and mixed, and is in a state of flux.”

(Eberle & Aicher, 2018, p. 406)

It follows from this that the perception of materiality depends on the distance from which it is read:

“Physical proximity corresponds with bodily intimacy and is a precondition of atmosphere. From this, we can infer the privileged status of private spaces. The mood of buildings in an urban surrounding is more distanced in comparison. From this we derive the differentiation of the materiality of architecture and the materiality of the interior of the design. While the former is bound to the permanence of the place, the latter is aligned with the changing needs of the user.”

(Eberle & Aicher, 2018, p. 408)

The method in detail and its implications

We know that the 9x9 method entails the completion of nine steps. Naturally, the students' level of knowledge grows with each completed step. The evolution and the implications of the method can be briefly described as follows (Eberle & Aicher, 2018, pp. 50-62):

1. Exploring the place

The students have understood how to read and express the character of a place. In addition, they have answered the question:

_How can an insertion improve the quality of the public space with minimal intervention?

2. Studying the structure

At this stage, the students know that architecture needs order; understanding the structure of an architectural element helps them reach reasoned decisions. Validation is carried out by finding the answer to the research question:

_What are the types of structure, relevant to my project, which I find in the building I study, in the urban fabric it is embedded in and in its vicinity?

3. Understanding the relationship between place and structure

The students have learnt that a correct intervention on a building cannot be made if one ignores the interdependence between the structure of the place and the structure of the building. This has been achieved by answering the following question:

_How can I define the type of building by starting from the characteristics of the place, a structure that can support the adequate load for these characteristics as well as an efficient circulation system?

4. Researching the envelope

At this point, the students can read the envelope as an interface between exterior and interior spaces. They have acquired this ability by working on the following question:

_How do the volume and the envelope of the building influence interior and exterior spaces?

5. Discovering the connections between place, structure and envelope

By the end of the first semester, the students are able to correctly design an addition to an existing building by following a spatial programme, a series of indicators and a set of requirements for facades, derived from the characteristics of the place. They have been guided in their design by two research questions:

_How does the proposed facade respond to the attributes of the place?

_Given these circumstances, how is the facade supported by the structure?

6. Knowing the programme

By this stage, the students understand the implications of the programme of a building and they have the ability to correctly design the associated functional diagram. They have been guided by the following questions:

_Given the structure of a building and the image of the main facade, which programme would be most suitable for it?

_How are building spaces organised for efficient access, horizontally and vertically?

7. Investigating the relationships between place, structure, envelope and programme

Students are now able to correctly design a building, aiming to balance the site characteristics with the constraints imposed by the structure, the envelope and the programme. To achieve this, they have answered the following questions:

_What factors influence the choice of a programme?

_What impact does the chosen programme have on the place, the structure and the envelope?

8. Examining materiality

At this point, the students know that materials alter the perception of space and that their choice must be reasoned and well-informed. The demonstration has been carried out by answering the question:

_How does materiality influence the atmosphere and quality of interior and exterior spaces?

9. Understanding the functioning of the whole formed by place, structure, envelope, programme and materiality

By the end of the second year, the students have come to understand the logic of an existing building and they are able to design an insertion into the urban fabric and to check its quality by pursuing the balance of the characteristics of the place with the constraints imposed by the structure, the envelope and materiality. The conditions with which they can operate are both measurable (quantitative), expressed by architectural and urban indicators, and immeasurable (qualitative). Finally, the last research questions used by the students are the following:

_How do the place, structure, envelope, programme and materiality contribute to the success of my project?

_Have I clearly answered all the requirements of the design brief?

For an overview, we have summed up in Table 1 the steps of the method and their implications, reflected on six levels: the nature of the research questions to be answered, the aim of the exercises, the exercise-specific questions, the scale at which the work is carried out, the expected products and the work set-up.

Table 1. Synthetic description of the nine steps of the 9x9 method
 Source: The authors' adaptation of the information presented by Eberle & Aicher (2018, pp. 54-59, 88-91, 140-144, 176-177, 218-221, 252-253, 320-323, 356-357, 408-411, 454-455).

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
1	Place	How can an insertion improve the quality of public space, with minimal interventions?	Recognising, understanding and expressing the characteristics of a place.	What is the character of a place?	Scale of the town / area	Site plan, at different scales	Working in a team of 8 to 12 students. Each team is allotted a site.
				How is observation conducted in the field?		A diagram of the urban design concept	
				How is the data collected?		A model of the studied site, inserted into another model which presents a larger area	
				How can the quality of public space be improved through an insertion?		A video that captures the character of the place	
						Field-collected data	
						Study journal	
				How does my proposal improve the quality of the urban fabric?	Scale of the building	Site plans, at different scales	Working in a team of 2 students.
		Understanding and articulating the impact that the proposed extension of the building will have on the urban context.				A photomontage that shows the impact of the researched building before and after the extension	
						A model of the building with the proposed extension	
						Written explanation	
						Study journal	

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
		<ul style="list-style-type: none"> _ What are the types of structure, relevant to my project, which I find in the building I study, in the urban fabric that contains it and in its vicinity? 	<p>Demonstrating the following two aspects:</p> <ul style="list-style-type: none"> _ A place can only be understood if its structure has been analysed and understood; _ In-depth knowledge leads to justified decisions. 	<ul style="list-style-type: none"> _ What are the relevant criteria for understanding a structure? _ What characterises the structure of the district? 	<p>Scale of the town / area</p>	<ul style="list-style-type: none"> _ Plans of the analyses at different scales _ A diagram of the urban design concept _ Plans of existing buildings _ Field-collected data _ Study journal 	<p>Working in a team of 8 to 12 students. Each team is allotted a site.</p>
2	Structure		<p>Understanding the fact that a functional building needs structural order.</p>	<ul style="list-style-type: none"> _ What is the relationship between static and spatial structure? _ How are the two balanced with the transition between interior and exterior spaces? _ How do I show the structural order in plans and sections? 	<p>The scale of the building</p>	<ul style="list-style-type: none"> _ Plans and sections of the building _ Photographs of the interior _ A sectional model of the building structure _ Field-collected data _ Written explanations _ Study journal 	<p>Working in a team of 2 students.</p>

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
3		<p>How can I define the type of building by starting from the characteristics of the place, a structure that can support an adequate load for these characteristics and an efficient circulation system?</p> <p>Place</p> <p>Structure</p>	<p>The correct design of the extension of a building by pursuing the clarification of structure and improvement in the quality of spaces.</p>	<p>How is the organisational scheme of a building structured?</p> <p>What is the relationship of the circulation systems to the rest of the spaces?</p> <p>How does my proposal improve space quality in the existing building?</p>	<p>Scale of the building</p>	<p>Site plans at different scales</p> <p>Plans and sections of the building</p> <p>A sectional model of the building structure</p> <p>A model of the building with the proposed extension, at an appropriate scale for understanding its impact on the place</p> <p>Photographs of the model</p> <p>Written explanations</p> <p>Study journal</p>	<p>Working in a team of 2 students.</p>

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
		<p>_ How do the volume and the envelope of the building influence interior and exterior spaces?</p>	<p>Learning the methods and techniques of spatial analysis by starting from two different elements: the street and the facade.</p>	<p>_ What characterises a street? _ What about a facade? _ What impression is conveyed by the composition elements of a facade? _ How do they relate to the space of the street and to facades nearby?</p>	<p>Scale of the town / area</p>	<p>_ A photomontage of a street section _ Sections and elevations of the street _ Field-collected data _ Study journal</p>	<p>Working in a team of 8 to 12 students. Each team is allotted a site.</p>
4	Envelope		<p>Mastering the methods of designing a facade, understanding its role as a link between interior and exterior space.</p>	<p>_ How do you design a facade? _ How does the proposed facade relate to the context? _ How does it connect interior to exterior space? _ What role does the level of access play in this?</p>	<p>Scale of the building</p>	<p>_ Site plan _ Existing and proposed building elevations at a large scale _ Existing and proposed facades at detail scale _ A photomontage of the existing situation _ Written explanation _ A model of the facade with all relevant details _ Field-collected data _ Study journal</p>	<p>Working in a team of 2 students.</p>

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
5	Place Structure Envelope	<p>_ How does the proposed facade respond to the attributes of the place?</p> <p>_ Given this, how is the facade supported by the structure?</p>	<p>The correct design of the extension of an existing building by following a spatial programme and a set of indicators. In addition, by comparison to step 3, the interplay of envelope, structure and place is also explored.</p>	<p>_ How is the interdependence of place, structure and envelope reflected in the design process?</p> <p>_ Where is this interdependence visible in my project?</p>	<p>Scale of the building</p>	<p>Scale of the town</p> <p>_ Site plans at different scales</p> <p>_ Facades</p> <p>_ Photographs of the study model built at the scale of the ensemble</p> <p>_ Written explanations</p> <p>Scale of the building</p> <p>_ Concept sketches</p> <p>_ Photographs of the study model built at the scale of the building (exterior and interior)</p> <p>_ Plans and sections of the building</p> <p>_ The two study models</p> <p>_ Centralisation of the norms and regulations to which the building is subject (Fire safety norms)</p>	Individual work

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
		<p>Given the structure of a building and the image of the main facade, which programme would be most suitable for it?</p> <p>How are building spaces organised for efficient access, horizontally and vertically?</p>	<p>Mastering the knowledge of urban and architectural indicators as assessment tools for the functionality of a building and of its economic impact.</p>	<p>What are the relevant urban and architectural indicators in assessing the functionality of a building?</p> <p>What do the indicators tell us about the relationships between the interior spaces of the building?</p> <p>What about the relation of interior to exterior spaces?</p> <p>How do I present clearly and succinctly the results of the comparison of two or more buildings by using a set of indicators?</p>	<p>Scale of the town / area</p>	<p>Plans and sections at different scales</p> <p>A set of urban and architectural indicators, calculated and interpreted.</p>	<p>Working in a team of 8 to 12 students. Each team is allotted a site.</p>
6	Programme		<p>Understanding the functional scheme of a building</p>	<p>What is the relationship between the programme of the building and the site?</p> <p>What are the main characteristics of the programme?</p> <p>How can they be conveyed through drawings and through a series of indicators?</p>	<p>Scale of the building</p>	<p>Study model</p> <p>Photographs of the model which show the volumes, the floors and the characteristic sections</p> <p>A series of urban and architectural indicators, calculated and interpreted</p> <p>Centralisation of the norms and regulations to which the building is subject (Fire safety norms, SIA 4163, VSS4)</p>	<p>Working in a team of 2 students.</p>

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
		<p>_ What factors influence the choice of programme?</p> <p>_ What impact does the chosen programme have on the place, the structure and the envelope?</p> <p>Place</p> <p>Structure</p> <p>Envelope</p> <p>Programme</p>	<p>The correct design of a building, pursuing the harmonisation of the site with the structure, the envelope and the programme. The complexity of the exercise is increased by the fact that students are free to choose the scenario and programme they work with.</p> <p>At the end of the exercise, students will obtain a first, preliminary version of the final project.</p>	<p>_ How do I decide what programme and scenario to work with?</p> <p>_ How do place, volume, its positioning, circulation systems and facades contribute to the success of the chosen programme?</p>	<p>Scale of the building</p>	<p>_ Concept schemes</p> <p>_ Site plans at different scales</p> <p>_ Plans of the floors and sections at different scales</p> <p>_ Facades</p> <p>_ Written explanations</p> <p>_ A study model</p> <p>_ Centralisation of the norms and regulations to which the programme is subject (SIA³ Norms 416)⁴</p>	<p>Individual work</p>

7

3 SIA norms (Schweizerischer Ingenieur- und Architektenverein) i.e. the norms created by the Swiss Society of Engineers and Architects have imposed an indispensable set of standards for urban planning and architecture projects. In particular, SIA 416 norms specify the surfaces and volumes of buildings.

4 VSS norms (Verband der Strassen- und Verkehrsfachleute), created by the Swiss Association of Road and Transport Experts provide a series of standards and procedures specific to the design and use of roads.

Suggested exercises							
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	Work set-up
		<p>How does materiality influence the atmosphere and quality of interior and exterior spaces?</p>	<p>Detailed documentation of the set of materials associated to the proposed project.</p>	<p>How do I study the qualities of the materials? Which of their technical characteristics are important for my project?</p>	<p>Scale of the town / area</p>	<p>A catalogue of materials Photographical documentation of the texture and use of materials Description of the technical characteristics of the materials</p>	<p>Working in a team of 2 students.</p>
8	Materiality		<p>The controlled detailing of the succession of spaces studied in the previous exercise.</p>	<p>How do I choose the appropriate materials depending on the succession of spaces, on their proportion and on the style I wish to create? How does light influence the perception of space?</p>	<p>Scale of the building</p>	<p>Plans and sections of a succession of spaces including circulation nodes A study model Photographs of the study model which show the materials Written explanations Study journal</p>	<p>Working in a team of 2 students.</p>

Suggested exercises				Work set-up			
Step	Primitive	Research questions	Aim of the exercise	Specific questions	The scale at which the work is carried out	Products	
		<p>How do place, structure, envelope, programme and materiality contribute to the success of my project?</p> <p>Have I answered clearly all the requirements of the design brief?</p>	<p>The correct design of a building or ensemble of buildings by pursuing the harmonisation of the place with the structure, the envelope, the programme and with materiality.</p>	<p>What are the elements that demonstrate the quality of my proposal ?</p> <p>How are the five parameters harmonised in my proposal?</p> <p>How do I present my project in an accessible manner?</p>	Scale of the building	<p>Scale of the town</p> <p>Site plans at different scales</p> <p>Facades</p> <p>Groundfloor plan with the indication of open spaces</p> <p>Photographs of the study model</p> <p>Written explanations</p> <p>Scale of the building</p> <p>Concept sketches</p> <p>Plans and characteristic sections of the building</p> <p>Photographs of the study model which illustrate a succession of spaces including the circulation nodes</p> <p>A series of urban and architectural indicators, calculated and interpreted</p> <p>Centralisation and representation of surfaces, calculated according to SIA 416 norms</p> <p>The two study models</p> <p>Study journal</p>	Individual work

After analysing the 9x9 method, we come to the conclusion that it has been developed on the basis of three principles.

(P01) Architectural practice and theory go hand in hand:

“Architecture must leave theory behind itself; it must become practical, must undergo materialization. [...] The on site doing also needs a shape, an idea, in order for its practical advantages to develop. [...] If design is neglected, then the knowledge of production spins off, loses itself in mannerisms.”

(Eberle & Aicher, 2018, p. 20)

(P02) The design process develops in the same manner regardless of scale. Students must work just as well regardless of scale.

No scale takes priority over another. Thus, studio exercises develop the students’ ability to work on every scale. In fact, the exercises are similarly calibrated, regardless of scale. This approach gives depth to the resulting product and leads to high-quality architecture.

(P03) The exercises unfold from simple to complex and repetition is important not only in consolidating knowledge but also in stimulating critical thinking.

“Repetition is essential, practice creates space for personal interpretation and inspiration.”

(Eberle & Aicher, 2018, p. 19)

On another note, let us look more carefully at how a student learns in a school of architecture. In the view of Jia Beisi (Eberle & Aicher, 2018, pp. 490-506) the efficiency of students’ learning does not depend exclusively on the learning content, but also on the management of the interactions (whether social or of a different type). Beisi cites three sources to validate this observation, namely David A. Kolb, N. John Habraken and Donald A. Schön, each of them responsible for developing teaching methodology and the last two directly interested in how architecture is taught.

Kolb demonstrates that experiential learning has two dimensions: prehension or simply uptake and transformation, i.e. digested knowledge. He also speaks about four learning styles:

1. Concrete experience where you learn by doing;
2. Reflective observation, which takes place when you learn by reflecting on what you did, on your experience;

3. Abstract conceptualisation, in other words formulating conclusions based on what you did;
4. Active experimentation, i.e. planning and testing the hypotheses you have imagined.

The four learning styles are integrated in an experiential learning cycle, from concrete experience to active experimentation and then back to concrete experience, yet certain styles weigh more depending on what is being learnt.

In the case of architecture, experiential learning is defined by concrete experience and abstract conceptualisation. Nabraken shows that in pre-hension mundane, everyday examples are more important than exceptional ones, while Schön shows that transformation and reflective processes are frequent in experiential learning.

In fact, in this context, the studio⁵ is the most important component of the learning experience in a school of architecture. It plays three major roles, being the place where the student learns and practices the following (Eberle & Aicher, 2018, p. 491):

1. The visualisation and representation of architecture;
2. Architectural languages;
3. Models of architectural thinking.

Thus, the studio is:

“intended to be a simulation of the reality of the built environment as well as a socially interactive and creative environment [...]”

(Eberle & Aicher, 2018, p. 491)

In other words, it is a safe environment where the students can learn by doing, experimenting, while avoiding the consequences of a real-life mistake. In addition, they receive guidance from a group of professionals who are experienced in designing and in explaining how one designs.

At the same time, the very nature of a studio determines its limitations and generates two problems that influence one another (Eberle & Aicher, 2018, p. 491):

1. There is a difference between reality and the studio simulation of reality;
2. There is a difference between what is taught and what is actually learnt by the student.

The 9x9 method has been developed and refined at ETH Zürich, one of the top 10 universities in the world (Lucien, 2021). The method is

⁵ The term “studio” refers both to the space where students work on projects, guided and evaluated by the tutors, and the totality of activities that take place in this space, from simple social interaction to the development of critical thinking.

well adapted to studio work and it relies on the knowledge provided by the tutors. We have shown this in “A short description of the method” and in presenting the three principles that underpin it. Meanwhile, we can assume that ETH Zürich met all the requirements of a successful studio where a highly competent teaching team and a group of curious, talented and dedicated students managed to reduce the two differences that can generate problems to a minimum. In this context, the method has been validated and it has contributed to a globally recognised process of learning⁶ (Quacqualli Symonds, 2021). But if the parameters of the learning environment change, will all this still work? Tutors may be anachronistic just as students may not be dedicated to the task.

_ Will the 9x9 method be as effective in this case?

Reviewing the method, for example by looking at Table 1, at the research questions, the specific questions and at the expected results, we note that they all demand action and practical experimentation. You learn by doing. Operationally, it negotiates the two learning styles that are specific to architecture: concrete experience and active experimentation, with a focus on the former. However, a few questions arise:

_ How do you learn architecture when you cannot access concrete experience and active experimentation in order to learn?

_ Can the method evolve and provide an effective solution to this situation or are there better alternatives?

And the final question:

_ Can the method be adapted for use in other disciplines, for example in urban planning?

Conclusions

We are now ready to present our conclusions.

Due to the manner in which it has been developed by Eberle, the 9x9 method has implications that are reflected on two related levels: didactics and design procedure. We have chosen to group our findings in relation to these two themes for ease of reading.

First, by examining the teaching process we note the following:

1. The 9x9 method is adapted to studio work, which involves two interested parties: the teaching team and the students.

Both the introduction of new concepts and the assessment of student results depend on the tutors. They are the ones who guide the development of critical thinking.

⁶ The QS Graduate Employability Rankings 2022 place ETH Zürich as number 22 among the top 500 universities in the world.

In their absence, the 9x9 method is difficult to learn through self-study since there is no supporting frame of reference to validate the student's decisions.

2. The textbook associated with the method is a useful instrument both for learning the design method and for teaching it.

The textbook aims for two goals, which it mostly succeeds in accomplishing. The first is to systematise what the students need to know (theory) and what they need to do (procedure) in order to design correctly; the second is to show how studios work, in other words how the tutoring team manages the learning activity. Regrettably, the manual does not provide a precise reading key of the results; we find out the assessment criteria but we never achieve a practical understanding of how projects are evaluated or what standard has to be met. For this reason, the book is easier to use by someone who already possesses an advanced understanding of the field. Nevertheless, the textbook provides examples that the students can use for guidance.

Second, in relation to the design method, we note that:

1. The 9x9 method is flexible and stimulates creativity.

We have previously shown that learning to design with the 9x9 method is easier if there is someone who can show you how it is done, but that once the method has been mastered it can be used independently of the presence of a tutor. Although conceived to support students in the early years of study, the method remains valuable for the more experienced students as it encourages creativity. Due to the universal character of its primitives, it can be applied anywhere since it is not linked to the specificity of a geographical or cultural space. Furthermore, it does not depend on the pre-existence of a fixed set of data regarding the situation upon which one intervenes. Therefore, it can be successfully applied in the case of a real as well as of an imaginary space. The difficulties may arise when the projects results are validated, in the absence of a clear evaluation procedure. This procedure can be created separately for each project.

Finally, a few questions are left open with regard to the flexibility of the application range of the method:

1. How efficient is the method in a less than optimal studio environment? Can it evolve and address this situation or are there better alternatives?

2. Can the method be adapted for use in other disciplines e.g. urban planning? If so, then how?

References

Eberle, D. & Aicher, F. (Eds.) (2018). *9x9 – A Method of Design. From City to House Continued*. Basel: Birkhäuser.

Eberle, D. & Simmendinger, P. (2007). *Von der Stadt zum Haus: Eine Entwurfslehre/ From City to House: A Design Theory*. Zürich: Gta Verlag.

Lucien, M. (2021). *Top 10 in the world for 8 years*. Available at: [https:// bit.ly/3j8c6GL](https://bit.ly/3j8c6GL) [16.10.2021].

Quacqualli Symonds (2021). *QS Graduate Employability Rankings 2022*. Available at: <https://bit.ly/2ZOpkyu>. [16.10.2021].