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### AN OVERVIEW OF EDUCATIONAL METHODOLOGIES AND PEDAGOGICAL APPROACHES TO ARCHITECTURAL EDUCATION

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**Summary:** The research presented in this paper is a review study that examines various educational methodologies described in the available literature in the field of learning and teaching architecture. The need for this type of research is based on the fact that teachers and associates in schools of architecture are in constant search for new and better educational methods, which makes an overview of the current state in the field of architectural pedagogy purposeful. The results of the research indicate the existence of different methodological approaches with common essential features that are described and explained in the paper.

Keywords: architectural education, studio, educational methodologies in architecure

### 1. INTRODUCTION

Architecture instructors in all educational institutions around the world are constantly working to improve the learning of architectural design skills. In order to achieve such a goal, it is necessary to investigate and establish modern methods and approaches to education in the field of architecture.

At the very beginning, it is expedient to define the term 'pedagogy', which, according to the dictionary definition, is "the science of principles and procedures in education" [1, p. 905]. Dutton [2] criticizes this definition, which recognizes pedagogy only as a method of teaching and offers a more inclusive one, which equates pedagogy with the social production of knowledge in general. According to this author, pedagogy implies "all those practices that define what is important to know, how it is learned and how the production of knowledge helps to shape social identities" [2, p. 171]. Mastering the skill of architectural design in educational circles is recognized as competency-based learning [3], and represents the ability to act in a poorly defined and constantly changing environment, solving non-routine and abstract work processes, decision-making ability and responsibility, as well as understanding of dynamic systems [4].

Boyer and Mitgang [5] argue that education in various fields of design – architecture, interior design, landscape architecture, and graphic design – is a model for nurturing critical, synthetic, and creative thinking. A key aspect of this form of teaching is the studio, which promotes critical and creative problem solving, i.e. a concept that is recognized in

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the literature as design thinking [6]–[12]. Traditionally, the design studio is considered the most important part of the educational program in schools of architecture, and as such represents a place where students are expected to understand, present and defend design ideas, as well as to acquire new techniques and skills [13].

In most other academic disciplines in university education, lectures are the most common form of teaching, where educating is done through lectures, assignments, and assessment of student performance through tests. The studio is different because, unlike lectures, students learn through project work, where they are expected to provide an effective solution to a hypothetical design problem defined by the instructor [14]. Akin [15] also recognizes the differences between teaching in the field of design and teaching in traditional academic disciplines, stating that in the first case, students are focused on a corpus of desirable outcomes, rather than on principles and theories. Based on that, students are expected to provide similar results with new characteristics. They are rarely provided with a set of principles, instead, they are expected to develop their own, which can lead to their creation of new solutions [15, p. 409].

In the last few decades, universities and schools of architecture have made significant efforts to improve design education, with the basic intention of enriching a purely artistic vision of architecture through the insertion of scientific knowledge and social responsibility [16]. Wang [17] also writes in support of the turmoil in the development of architectural education and confirms that a change in the way educators articulate their epistemology and methodology is necessary. The same author recognizes that the design process is focused on subjective creativity, as opposed to the positivist university paradigm focused on objective rationality. Based on the sacrifice of intellectual rigour for the sake of achieving social significance, design education has experienced marginalization in relation to the university model of education [17]. This unpleasant fact is known to all teachers and associates who participate in the realization of academic education in the field of architecture. In order to make design education more rigorous, and therefore more academically respectable, Wang [17] suggests that it must become more rational or embrace a new paradigm that values the creative experience.

### 2. HISTORY OF THE STUDIO CONCEPT

The structure of the curriculum in schools of architecture can be traced back to the wellknown Vitruvius triad of firmness–utility–pleasantness (lat. *firmitas–utilitas–venustas*), which means that numerous perspectives and skills are necessary for graduates in the field of architecture [18]. The concept of the design studio originated from the workshops of medieval craftsmen and the royal academies of the Renaissance, where knowledge and skills were transferred for centuries by the method of 'master and apprentice' [19]. The early roots of the concept of the studio in architectural education are often linked in the literature to the teaching of the *Ecole des Beaux-Arts* in Paris, where students had access to courses and studios in various subjects. Such studios brought a new approach to architectural education, which Schön [20] later described as 'learning by doing'. Since then, the design studio has been at the heart of architecture education [18].

In the 1920s, under the influence of the modernist movement, architectural education was reformed to meet the needs of the new socio-economic context. The heart of the modernist movement, the German Bauhaus school, led this transformation and integration of new

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concepts related to mass production and new technologies [21]. The Bauhaus was one of the pioneers of new forms of architectural education, which marked its image with a utopian definition of building the future under the slogan "art and technology - a new unity" [22]. This reform had a significant global impact on schools of architecture, especially during World War II. Although Bauhaus ideas transformed architectural education, the learning model in the studio remained almost unchanged [18].

Any discussion of architectural education inevitably deals with the traditions of the Ecole des Beaux-Arts and the Bauhaus. The contrasts of the two schools are well known, but it is interesting to see that a significant part of their differences lies in the concept of a proper architecture curriculum, more than in the relationship between students and instructors [23]. Indeed, the concept of apprentice and master is emphasized in both concepts, although the atelier differed significantly from the workshop. Modernist students are directed, contrary to the previous tradition, towards inventive versus imitative design. When the International style led to postmodernism, there was a return to the inclusion of historical patterns in architectural styles, and then in pedagogy. Later, during deconstructivism, the teaching of students changed again. This time, students are encouraged to work on analytical abstractions of form and composition that violate classical and modernist principles, demonstrating once again that design principles are relative at best [15]. From the beginning of the XX century, the question of 'how' has an advantage over the question of 'what' in design education, and among pedagogues, there are attitudes that confirm the growing role of the process versus the product in technologically integrated design processes [24]. Despite heated debates, interest in explicit design processes has been stimulated by the Design Methods movement [25].

The modern paradigm of architectural design is increasingly integrated into information technology and requires open and dynamic design processes. Today, more and more design ideas and processes are presented through various, perhaps vague, but still seductive diagrams, thus encouraging the growing field of research into design methodology and techniques [24].

### 3. DIFFERENT PEDAGOGICAL APPROACHES IN LITERATURE

Regardless of the specific domain of design, traditional educational models in design education are based on the repetition of a professional way of performing tasks. The measure of learning is usually equated with the evaluation of design products, instead of what can be considered an increase in knowledge [26]. Advances in learning technologies have resulted in a continuous search for more practical and successful teaching and learning methods. During this complex search, accepted concepts were re-examined and redefined based on new scientific knowledge. Theories on how human beings learn have also been improved, resulting in new theories to describe the complex relationships between the processes of cognition, knowledge, and students [27].

*Constructivism* as a theory of learning emerged during the 1990s and rejected the objectivist view of reality and the idea that simply presenting content to students would result in learning [28]. Constructivism is the dominant pedagogical approach in which learning involves the acquisition of new cognitive structures. Constructivist theories of learning suggest that the student is not only a passive recipient of knowledge, but is an active participant in the learning process and that he constructs his knowledge based on

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personal experience and relationships with concepts. This approach is usually interpreted as learning by doing [29]. Constructivist teaching strategies are characterized by the concepts of shared and cooperative learning, problem-based learning, discovery, and practical learning [28]. Different teaching methods and techniques derived from constructivist learning theory have been used in different disciplines to equip students with the necessary instruments to build faster and better-preserved knowledge [27].

The procedures and processes of teaching and learning in an architectural studio have been examined by many authors, but the foundations of such research were laid by Schön in a number of books and scientific papers [20], [30]–[34]. Based on a constructivist view of human perception and thought processes, Schön [20] describes the design process as a thoughtful conversation with a design situation, in which designers actively pose problems, then take action using spatial language (sketching and drawing).

Schön's studies represent a turning point with an emphasis on the importance of empirical studies in the field of design, cognitive studies, and design pedagogy [35]. Oxman [26] states that Schön's work in the education of the *reflective practitioner* represents two key modifications in the traditional model of design education. First of all, the dialectical nature of design is treated as 'interaction with the materials of the problem'. The idea of thinking about a problem through the medium of conceptual drawings introduces the cognitive orientation of design reasoning as the basis of design learning. Another reorientation lies in the definition of the difference between interactive types of visual thinking and design ideation. Finally, student-teacher interaction becomes a participatory process in which the articulation of principles during the dialectical design process becomes the responsibility of the teacher as an articulator of values and issues that motivate changes in subsequent phases of design as a research process [26].

Actual design practice in a problem-based studio in most design schools rarely, if ever, treats the cognitive processes of design thinking as forms of explicit teaching content. Educational research suggests that the organizational structure of knowledge is at least as important as the amount of knowledge in understanding any particular domain of knowledge [29].

Normative theories of learning indicate that success is most likely to be achieved when students learn: 1) principles that govern events or phenomena in a discipline, and 2) ways to apply these principles in specific situations to solve problems of various kinds. This method is called didactic [15]. The didactic model is characterized by a systematic presentation of the basic principles of knowledge that identify a particular domain on which to build a corpus of applications or problem-solving skills. Most academic disciplines, especially traditional ones, use a didactic approach. In areas of professional practice, such as design, teaching deviates from this pattern in a significant way. Students are rarely offered strict principles, let alone immutable ones, on the basis of which they can construct error-free projects. Instead, students are given many precedents from which to learn through heuristics. This type of knowledge is fundamentally located in the context of off-domain information and its pedagogy is experiential [15]. The experiential approach is ubiquitous in architectural curricula. Descriptions of teaching design, i.e., architectural curricula are always indirect in nature. They describe the stylistic or formal attributes of the architecture promoted by a particular pedagogy, to explain their characteristics, principles and techniques [15].

Although little stands in front of basic design principles, much lies in discovering how principles affect solutions to a particular problem and how specific solutions can illustrate

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broader principles. Moreover, this is done in generate-and-test mode. Students learn by applying design principles and thus infer principles. The faculty plays the role of coach or critic in this process. Cognitive skills that support these operations are developed after numerous attempts and almost as many mistakes [15].

Project-based studio methodology continues to be a basic form of teaching architectural design in schools of architecture. This methodology has proven to be an effective tool for introducing students to the principles of design, problem-solving, planning, design, tectonics, building types, and for developing aesthetic assessment as well as analytical and presentation skills. One of the benefits of learning in a project-based studio is that it promotes active research and problem solving under the guidance of an experienced practitioner. In most schools, the complexity of project types and their scope increase as the student moves through the study curriculum [3].

Designing is a skill that is acquired. Contrary to the common belief of many instructors, learning to design involves more than developing innate abilities and capacities in a study environment, through solving gradually more complex design problems over a period of time under the guidance of an experienced tutor. Learning to design involves a complex transformation of ways of thinking about a problem. This implies the accumulation of a complex, interdisciplinary domain of declarative/conceptual knowledge, mastery of procedural knowledge and experience that leads to the application of strategic knowledge. Learning to design follows a developmental process in which beginners rely heavily on declarative knowledge and simple heuristics to solve a design problem, while experts rely on procedural knowledge and the ability to adapt to new situations [3]. One of the ways in which instructors can reduce the stress of entering the studio is through the division of the design process into its constituent parts, phases and skills, i.e. to offer a design methodology [3]. Special exercises can be designed to improve skills or learn basic concepts. In this process, instructors guide students through the process. This exercise, which requires focusing on isolated tasks, is characterized as deliberate practice.

Learning to design is a developmental process in which effective methods are developed to approach design problems through increasing knowledge and experience. Many instructors use a design methodology that is inconsistent with the way students approach design problems at different stages. Therefore, Curry [3, p. 632] suggests that through understanding the cognitive theory and principles behind acquiring expertise in the field of design as a cumulative development process, design education can be significantly improved by introducing appropriate methodologies as teaching strategies in developmental stages. According to this author, the key is to identify the right design methodology for the student at the appropriate stage.

Salama [36] recognizes that in architectural education there is a change from 'mechanical' to 'systemic' pedagogy. In the mechanical approach, the process of educating future professionals is reduced to a large number of unrelated components. Mechanistic orientation treats students as machines with combined properties and characteristics of the recorder, that is, the student is evaluated in relation to his ability to reproduce what is said or shown to him. In mechanistic mode, instructors make no effort to link the information they represent, that is, the course or module in one subject does not relate to the content of another. This supports the idea that knowledge consists of many unrelated parts, which emphasizes hypothetical tasks rather than real questions. In contrast, systems pedagogy focuses on understanding the relationships between different pieces of knowledge [36].

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Systemic, or transformative pedagogy refers to the interaction processes and dialogue between instructors and students that strengthen the collaborative creation and distribution of power in a learning environment. As a concept, it is based on the fact that the interaction between instructors and students reflects and nurtures broader social patterns. Transformative pedagogy in architectural education deals with the harmonization of the creation of ideas and solutions with the social and environmental responsibilities that should be included in such sharing. Although transformative pedagogy and its concept of hidden curriculum [36]. The transition to transformative and systemic pedagogy is evident in a number of learning mechanisms generated and tested by educational psychologists in many disciplines. However, three mechanisms can be introduced as part of the process of learning architecture - these are exploratory, active and experiential learning [36].

Kowaltowski et al recognize six basic teaching methods that can be identified in a studio environment: 1) teaching based on a given architectural program and location for a particular project or architectural typology; 2) teaching based on the discussion of the architectural program, developed by the students for the appropriate urban area; 3) introduction of a real and local design problem into the studio and development of a participatory relationship, with analysis of the problem and justification of the solution; 4) teaching as a combination of architectural theory and practical design activities; 5) teaching using methods of generating form and formal architectural languages; and 6) teaching through research of specific CAD tools [16].

In a recently published comprehensive study, van Dooren et al [37] observed a rich differentiation of educational models of architectural design and distinguished three main perspectives, i.e. directions. The first direction marks the notion of 'architectural vision' and focuses on the content of architecture. This direction deals with cultural and personal attitudes about 'good architecture', where as a result, educational models or teaching take place implicitly [37]. The second perspective is based on a scientific and cognitive point of view and is inspired by the success of scientific disciplines, and on a theoretical level introduces a discussion on the role of scientific knowledge in relation to architecture, and especially to the design process. The third perspective is based on the educational point of view, and with the development of pedagogy, an increased contribution from these sciences to architectural education can be noticed. Terms such as educational goals, evaluation criteria, and curriculum design are used to help teachers more clearly structure design education and help students understand what they need to learn [37].

### 4. DISCUSSION AND CONCLUSIONS

The research presented in this paper aimed to examine educational methodologies, pedagogical approaches, and models of acquiring knowledge in architectural education. Through the analysis of various methodologies described in the available literature, which includes books, papers published in prestigious international journals, and announcements from international conferences, one can see the general directions of development of architectural education today.

First of all, it has been established that the methods by which students acquire knowledge are crucial for the improvement of architectural education. Also, it was found that the education of architects deviates greatly from the traditional university model of education,

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which is based on a didactic approach. Namely, education in the field of architecture is shaped as experiential learning that is realized through work on projects. The core of education is the architectural design studio, which is a place where students for the first time encounter problems of particular complexity in terms of understanding the problem, seeking architectural justification, managing contextual influences and negotiating with program requirements of a particular typology. The concept of the studio originates from medieval craft workshops and was shaped in the two most important schools of architecture throughout history - the French Ecole des Beaux-Arts in Paris and the German Bauhaus. Although the studio has undergone some modifications in the past almost three hundred years, the essential settings have remained the same - the student's task is to express creativity and imaginative and intuitive knowledge relevant to a specific design problem.

Numerous different models of architectural education have been described in the literature, but it is possible to report general guidelines that are common to all the described methodologies. Learning architecture is based on results and outcomes and is focused as students. As such, it differs from the teacher-oriented paradigm. The essential task of architectural education is to teach the ways and methods of design while instructing students to discover their own design principles. Modern approaches to architectural education are based on constructivism as a theory of learning that assumes that the student is an active participant in the learning process, and that knowledge is acquired in the form of learning through work. The analysed research also indicated that empirical studies in the field of design, cognitive studies and pedagogy in general are of great importance for the improvement of architectural pedagogy. In addition, learning architecture should follow the development process of each individual, i.e., the selected teaching methodologies must be in accordance with the cognitive level of students, and the methodology should be adjusted in relation to the level of study.

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### ПРЕГЛЕД ОБРАЗОВНИХ МЕТОДОЛОГИЈА И ПЕДАГОШКИХ ПРИСТУПА У АРХИТЕКТОНСКОМ ОБРАЗОВАЊУ

**Резиме:** Истраживање приказано у овом раду представља прегледну студију која испитује различите образовне методологије описане у доступној литератури из области учења и подучавања архитектуре. Потреба за овим типом истраживања утемељена је у чињеници да су наставници и сарадници у школама архитектуре у непрекидној потрази за новим и квалитетнијим образовним методама, што преглед актуелног стања у области архитектонске педагогије чини сврсисходним. Резултати спроведеног истраживања указују на постојање различитих методолошких приступа са заједничким суштинским одликама које су у раду описане и образложене.

**Кључне речи:** архитектонско образовање, студио, методе подучавања у архитектури