An Analytical Overview of Futuristic Strategies in the Practice of Interdisciplinary Architecture Education

Bilgehan Yılmaz Çakmak [1], Tuba Özdemir Erdoğan [2], Emine Banu Burkut [3]

[1] *Konya Technical University, Faculty of Architecture and Design, Department of Architecture, Konya, Turkey*
[2] *Yozgat Bozok University, Yozgat Vocational School, Department of Design, Interior Design Program, Yozgat, Turkey*
[3] *Konya Technical University, Institute of Graduate Studies, Department of Architecture, Konya, Turkey*

Abstract – **Architectural education is a universal discipline that requires an artistic, technical, and holistic perspective. It is a field of science and art that focuses on problem-solving and spatial creativity. As in all fields of science and art, the boundaries and scope of the field of architecture cannot be drawn. Its structure is so broad that it cannot be limited to a single discipline, and at the same time, it is flexible enough to make room for itself in every discipline. In this respect, even the concept of interdisciplinary is insufficient to coincide with the discipline of architecture as it describes a certain cross-section, and it becomes important what the disciplines that include architecture are and what the sentences of architecture can be in areas other than known disciplines. The headings that can be addressed separately are defined under the title "interdisciplinary," and the concept continues to exist as an unexamined area in the flexible and variable structure of architecture without being deepened enough. What is important is to define well which discipline influences to what extent and to define that all interdisciplinary subjects are areas that serve the main purpose of problem-solving and spatial creativity, to preserve the core balance of architecture without getting lost in the vast universe.**

The study aims to make an analytical look at architectural education, which is the environment where the concept of interdisciplinary in architectural practice is given and the boundaries are first taught. In this way, new expansions and questions are expected to arise in architectural education. From an analytical perspective, the issue of balancing architectural education and industry will be discussed using the PESTEL analysis method, which is a method used in strategic planning and especially in the field of business administration.

Keywords – **architectural education, interdisciplinary, futuristic strategies, PESTEL analysis.**

1. Introduction

Political, economic, sociocultural, technological, environmental, and legal processes from the past to the current digital age are changing the living standards of society, its perspective on events, and its ability to interpret and question. Since architecture is a field of science and art with problem solving and spatial creativity at its core, and since it serves society, it is involved in all these changes and processes and develops new strategies for them. Digital age, architectural education and practice is affected by the emerging and increasing number of specializations and interdisciplinary issues and needs to develop its infrastructure in order to meet the supply and demands of the age, to solve problems, and to offer more possibilities in the creation of spaces [1], [2].

The digital age structuring has led to the formation of interdisciplinary interactions. According to Choi & Park (2006) multidisciplinary draws on knowledge from different disciplines, it stays within their boundaries. Thus, it becomes a coordinated and coherent whole by analyzing, synthesizing, and harmonizing the connections between disciplines [3].

In parallel with this development, the educational curriculum has also developed, leading to the emergence of many new professions and specializations. In the digital age, the field of architecture is in close relationship with many disciplines such as art, fashion, cinema and caricature [4], [5].

This study aims to take an analytical look at architectural education and the environment where the concept of interdisciplinary in architectural practice is given and the boundaries are first taught. In this way, it is expected that new openings and questions will arise in architectural education.

2. The Process from Past to Present and Future in Architecture Education

The aim of the methodology section is to describe how the research was conducted and to enhance the credibility of the study. In case of quantitative aresearch, methodology should present the way numerical data was collected and how mathematical analyses are conducted to observe, analyze, access, and test experiments and hypotheses. Qualitative research involves collection and analysis of non-numerical data (e.g.: text, video, or audio) with the aim of explaining concepts, opinions, perspectives, or personal experiences.

When we look at architectural education from the past to the present, it is seen that innovative changes have been made in the education system with the changes in technology and trends. Chiefly, 21st century architecture is in a constant change and transformation with new courses and new methods of expression added to the curriculum following the requirements of the rapidly changing age. Especially with the national and international accreditation issue being on the agenda in the last 10 years, it is seen that architectural education is in a rich transformation with its course contents, number, diversity, and alternative workshop contents [6], [7].

In addition to the developing and influencing architectural education system, it is critical to consider the changing student profile, the number of architecture departments in universities, and student quotas. Numerous factors influence each of these topics, including the basic education system, the use of technology in daily living, career prospects after graduation, and the country's socioeconomic considerations.

Online education brought about by natural disasters has taken its place in architectural practice as a new parameter [8], [9].

Vitruvius' "Ten Books on Architecture" is one of the first theoretical building blocks of architecture [10]. According to this book, architects should be trained with an interdisciplinary perspective.

In international meetings and symposium on architecture, issues such as the quality of education given in faculties of architecture, physical conditions, duration of education, quality of education, physical conditions, lecture hours of faculty members, obligations to practice, diversity and duration of compulsory internships, and adaptation to professional life are discussed and solutions are sought [11].

A barrier to professional practice has motivated architectural education to collaborate with other disciplines and open up new avenues for its expression. The major purpose of architectural education is to provide students with curriculum and practice areas that will help them enhance their knowledge and abilities in the context of quality and originality. This raises the question, "What are the basic disciplines involved in the practice of architecture, and what interdisciplinary study and research topic are we to add? Also what work can be done in interdisciplinary cooperation on this issue?"

3. Basic Fields and Disciplines in Architectural Practice

Architecture is a field of science and art that deals with all the needs of human beings from the most basic to the most complex and produces solutions in this direction. It should not be overlooked at this point that architecture is not only designing and producing solutions but also the art of production, supervision, and organization. In this context, we can say that architecture is related to all fields of art, science, literature, and technology, and at the same time, it should be related to areas such as the presentation, marketing, written and verbalization of architectural productions, advertising in national and international arenas, and its place within the framework of laws. Within the framework of these relationships, it is clear that architects, who should receive a multifaceted education, can be successful in a multifaceted and multidisciplinary field and can use their design powers.

As the phenomenon of design is in every field, the concepts of "design" and "creativity" in every field from the past to the present expand their scope and bring art and architecture together on a common ground. In today's modern world, art contributes to the formation of a fertile environment suitable for design by feeding architectural education and practice. Architecture has a strong relationship with other art forms. Cinema, literature, music, painting and sculpture, theater, and dance, as well as other branches of art, are included in architectural education, and architecture is also included in these branches of art.

When we look at the content of architectural education, we see how weak its relationship with art branches remains. When we look at the basic courses, we see architectural history, architectural knowledge, building technique and detail knowledge, project and application courses, construction and urbanism knowledge, and architectural education as elective courses. Cinema, literature, music, painting and sculpture, theater, and dance, which we call other art branches, are taken as elective courses in some architecture departments, while in others they are included at the graduate level. In many architecture schools, unfortunately, the relationship between these art branches and architectural education is not mentioned at all. In light of technological developments and advances in our age, with globalization that eliminates borders, individuals who are completely directed toward consumption are emerging, and radical changes are occurring in the structure of society. In this context, it is unthinkable that art, which is one of the important phenomena in the progress of society, remains in its place. The phenomenon of consumption has managed to influence art as it has taken over the whole world, and it is seen that art is now under the influence of the consumer society rather than revealing its original thoughts. The concept of "design," which changed and developed with the mass production brought about by mechanization after the Bauhaus approach, one of the schools of architectural education, forms the basis of today's consumption elements.

4. Interdisciplinary Architecture

Architecture, which is in constant interaction with other disciplines whose boundaries are not clear, is a basic field that includes many disciplines such as design, art, technology, sociology, and history. The fields in which the professions in the basic field of architecture exist effectively are also expanding and enriching their boundaries daily. The interdisciplinary education and training model that is realized in this context makes it indispensable to work as a whole team due to its theoretical-application unity and holistic, technology-art-science trilogy. Researchers have focus on the interdisciplinary approach and methodology in architecture [12], [13].

Within the framework of this perspective, it is stated that it is necessary to adopt as a principle the restructuring of an education-teaching method that is transparent, participatory, sharing, open to all kinds of innovations and developments, directive, and encouraging in interdisciplinary architecture education.

The title book "Ten Books on Architecture", Vitruvius defines architecture as "Soundness, Usefulness, and Beauty". Despite developments and changes worldwide, architecture is central to the trinity of science, art, and technology.

In the Bauhaus program, architectural education was given through art, craft, and building sciences with the motto 'every branch of design and every type of technique' [14]. According to Architect Walter Gropius (1919) Bauhaus manifesto, Gropius emphasizes that all branches of art should be together in the production of architecture:

"Architects, sculptors, painters, we must all return to the crafts! For art is not a "profession." There is no essential difference between the artist and the craftsman. The artist is an exalted craftsman. In rare moments of inspiration, transcending the consciousness of his will, the grace of heaven may cause his work to blossom into art. But proficiency in a craft is essential to every artist. Therein lies the prime source of creative imagination" [15].

When we examine the pioneering architects throughout architectural education, we see that each of them is not only an architect but also a painter, sculptor, photographer, handicraftsman, or graphic architect. This shows us how intertwined architectural education is with other disciplines and that sometimes other disciplines come to the fore. Le Corbusier was a painter; Walter Gropius did not only draw building projects but also designed a locomotive; and Zaha Hadid produced furniture and fashion designs in addition to her architectural designs (Figure 1) [16]. She is a fashion designer. Frank Gehry's designs are not only architectural but also artistic. Gehry is a sculpture artist (Figure 2) [17] and architectural fashion for example; architect Frank Gehry designed a hat for Lady Gaga [18].

Figure 1. Architect Zaha Hadid as Fashion Designer

Figure 2. Sculptor Frank Gehry [17]

Architects offer services in their offices that include not just project development, but also interior architecture, material manufacture, decoration, and object design. Architects' simultaneous thought and creation in an effective and modern language, while establishing a balance between design and presentation, as well as design education, is a phenomenon that boosts productivity and ability to generate. An architect, illustrator, and academician has offered a new and creative viewpoint on the architect's approach to the city with his works, in which he uses large pictures to convey the stories of streets in various provinces (Figure 3).

Figure 3. Drawings on City Photographs [19]

Architects' professional experience is not confined to the act of developing projects and designing buildings; it also includes addressing global and human concerns. The Design Biennials, which expose the world's challenges in an artistic way through spectacular spatial installations, appear to be a platform that represents the core problems of architectural practice at this time. The 16th Istanbul Biennial's theme, "Seventh Continent", is characterized as an exploration of art, human influences, the paths it pursues, the traces it leaves, and its relationship with non-humans [20].

In the 16th Istanbul Biennial, Eylem Pala used his broad perspective as a designer and architects to create design objects out of garbage bags. It was also emphasized that architects must engage with the future in addition to designing structures. In addition, Eylem Pala used another way to contribute an architectural design to the space by combining design expertise with others. One of the physical reflections of the Istanbul Biennial, which claims that tons of bags pollute the earth as rubbish creates a seventh continent, is the work of architect Eylem Pala. At this point, she expresses her manifesto as "to apologize to the world we have polluted, to re-present the things we have polluted to our common life, which does not exclude any living thing without exception, so as not to pollute them again this time" [21].

In the drawings and cartoons that draw attention to the artistic and idea-producing dimension of architecture, he emphasized that sketching is an act of thinking and the experience of thinking with sketches and taking visual notes, which lies at the basis of architecture (Figure 4). At this point, he emphasized the importance of sketching in thinking and producing a balance of architecture [22].
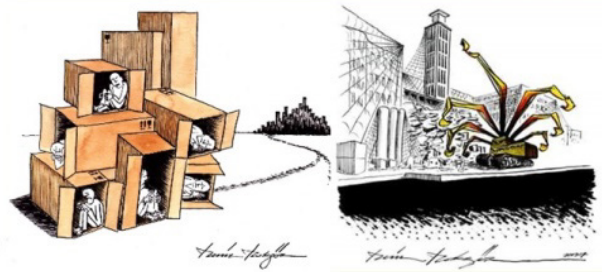

Figure 4. Cartoons Addressing Urban Problems [22].

Another architectural practice that combines all disciplines with an artistic and architectural perspective is the work of a media artist and designer who has developed an innovative and contemporary method for transforming digital, technical, and mathematical data into artistic and spatial works. These strategies are based on an interdisciplinary view and perception of architecture. In his early works, Refik Anadol constructed sculptures based on architectural data, which he displayed in public places. As time passed, he transformed data from a variety of fields into artificial intelligence algorithms, eventually leading to massive projects that he wanted to display in public places. Within the scope of his recent works, Refik Anadol collects visual, auditory, seismic, geographical, meteorological, cultural, and every conceivable kind of data in collaboration with giant institutions and organizations, including NASA and Google, and presents them to the public as works of art, feeding artificial intelligence programs. (Figure 5) [23]. In this way, the artist creates data sculptures that show how the technology and machines we live in perceive and interpret data and continues his life and work abroad by collaborating with international institutions and organizations (Figure 6) [23].
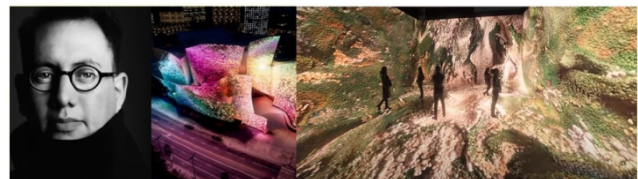

Figure 5 The Works of Art Reflected on the Facades and Interiors of Architectural Buildings in which Big Data and Images Covering Millions of Information are used as Canvas [23].

Figure 6. Machine Hallucinations Produced by Light Sound and Motion [23]

In the first half of the 20th century, Marchel Duchamp, one of the most important representatives of the Dadaism art movement, which emerged in the first half of the 20th century, adopted the principle of irregularity (Figure 7). Andy Warhol, the iconic name of the Pop Art movement that emerged in the other half of the same century and put popular culture at the center of art, presented consumer objects as art [24].
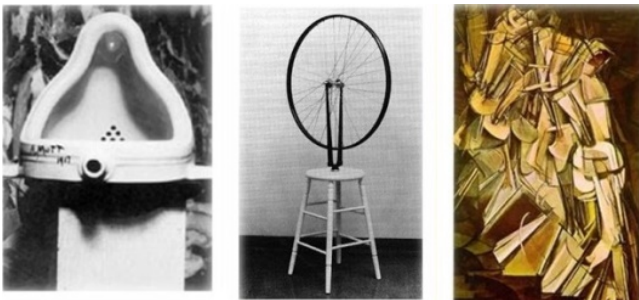

Figure 7. The Works of Duchamp [25].

5. Methodology

Determining a new strategy in the architecture sector is possible by analyzing the current situation. In addition to the change in the internal process of education itself, determining its status within the architectural sector and the path it follows within educational policies is also possible by determining the current situation and future strategies. In this context, the active use of other analysis methods such as SWOT analysis, which is frequently used in the discipline of architecture, is important for sectorial development and gaining new perspectives.

Before implementing any strategy, a detailed analysis of the situation is required. PESTEL analysis is an important tool to help create such an analysis for the organization (Figure 8). It is also a strategic management technique used in the business world as an external analysis tool when conducting market research, but also used by organizations to strategically manage different projects. Therefore, it is an important market and environmental analysis tool that supports decision making [26]. Pestel analysis has been used as a method in many current studies [27], [28].

Figure 8. PESTEL Analysis [29]

When we consider the architecture sector specifically, it is seen that architecture is in transition between fields other than just design education and building production and that the architecture sector is in cooperation with many different sectors in terms of economic gains and trends. While this widespread cooperation improves the architectural profession, it may also cause it to be damaged and lose its impact as a result of loss of balance and change of weight. For this reason, it is very necessary and important for the architecture sector to make a strategic analysis and determine the boundaries of this cooperation. To support the systematic approach of PESTEL analysis, structure the analysis and understand all the main factors and questions (Figure 9).
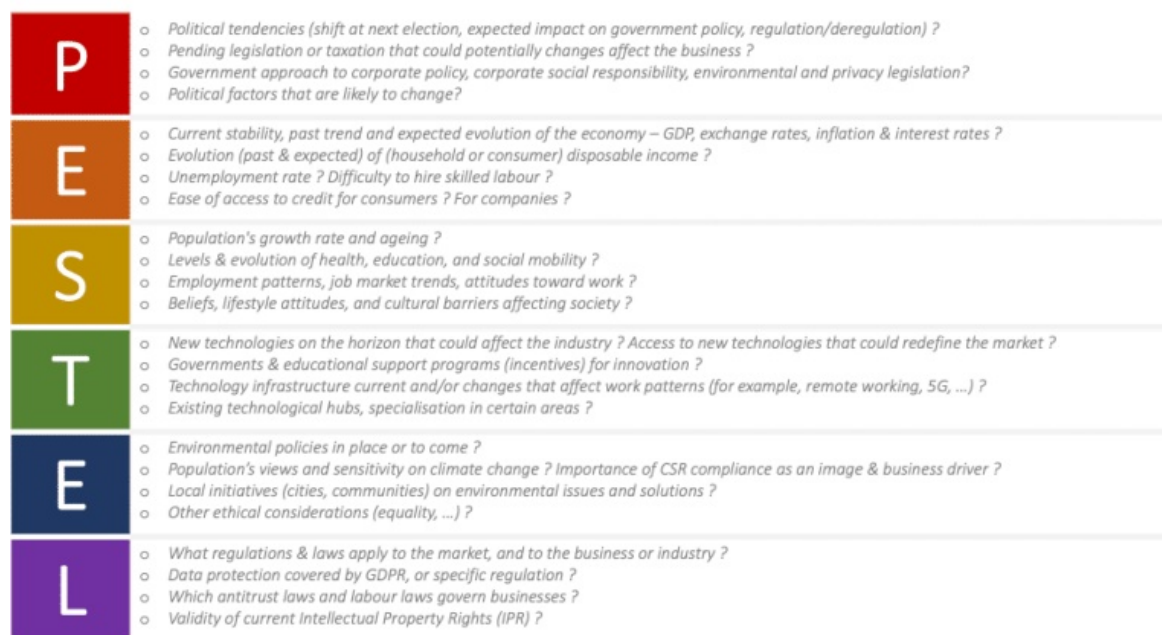
Figure 9.4 PESTEL Analysis [29].

6. PESTEL Analysis

Interpreting some events that may occur in the future with grounded farsightedness depends on the internal and external environment and the events that shape this environment. Many key points are affected by and interact with the external environment, and evaluating all of these points both individually and together to create an accurate decision process is called PESTEL analysis [30].

PESTEL analysis consists of political, economic, sociological, technological, environmental, and legal factors [30].

P - Political: With globalization occurring all over the world, the impact of political factors is increasing and accelerating. Democracy, human rights, freedom of belief and thought, and the right to education are gaining power that affects all countries and institutions on a global scale [31]. It refers to the extent to which the government in a country influences a particular sector. At the same time, the weight of the sector in the country's politics and its development potential are also addressed under this heading. It is an important tool in determining the importance of architectural approaches in the country's policy in both educational and sectorial terms.

E - Economical: The determining factors of a field's performance that directly affect the sectors related to that field and have long-term repercussions. Architectural education is directly related to economic factors, both due to its educational content and post-education requirements. In this context, a sectorial strategic decision will affect the national economy.

S - Sociological: It arises from the social environment of a market and has determinants such as cultural trends, demographic structure, and population statistics. The sociological factor takes into account all events that affect the market and the community socially. Therefore, the advantages and disadvantages for people in the area where the project is being developed have to be taken into account, too. These events include cultural expectations, norms, population dynamics, health awareness, professional standards, global warming, etc. It is important to analyze the multidisciplinary nature of architectural education, as well as its multicultural and multivariate characteristics under this title.

T- Technological: It includes innovations in technology that affect operations in an industry. This refers to a sector's relationship with technology, research and development activities, and technological awareness. The discipline of architecture needs to be closely related to rapidly changing technology and needs to be constantly updated.

E - Environmental: This factor considers environmental issues that may be economic or social.

These include temperature, storms, natural disasters, rail, air, and road access, soil conditions and pollution, nearby water resources, etc. Considering the sustainability and environmental sensitivity aspects of architecture, environmental factors are important in the effects of different disciplines on architecture.

L- Legal: Existing legal regulations include zoning laws, architectural policies, ethical rules, and legal processes.

7. Results

This section interprets the findings of the PESTAL analysis and interdisciplinary architectural education.

P: Political (Political factors):
Architecture is defined as "architecture, which is a building and space design activity that organizes living spaces from shelter to urban design, is an art that depends on the needs and structure of society, economic data, and technological developments" [29]. Professional organizations such as the International Union of Architects (UIA) and the European Council of Architects (ACE) strive for the implementation of architecture within a coherent policy framework in ways that will improve social benefit and ecological balance. Although there are reasons, such as trying to strengthen national economies and increasing employment opportunities, more is needed for the practice of architecture to focus on more than just the sectorial and consumption context, valuing design and idea production, protecting intellectual works, increasing the authority of institutions that defend the professional rights of architects, and emphasizing quality-enhancing practices such as compulsory internships and professional qualifications in national policy are necessary for architectural practice to gain a strong place in national policy.

E: Economic (Economic factors):
The project and implementation obtained in the right way and with scientific methods minimizes expenses. Thus, qualified architectural practices contribute directly to the national economy and welfare. They are the determining factors of a field's performance that directly affect the sectors related to that field and have long-term reflections. Architectural education is directly related to economic factors due to both its educational content and post-education requirements. In this context, a strategic decision in the sectorial sense will affect the country's economy.

It would not be correct to say that the architecture sector was not affected by this crisis during the economic crisis period, which was also affected by the natural disasters and earthquakes. We see the reflections of the troubled period our country is going through in both project activities and production and construction activities. The reflections are seen in a wide range of frameworks from academic inadequacies in architectural education to virtual marketing and production forms, from the use of technology in education to the decrease in scholarship opportunities abroad. It is only by getting out of this impasse as soon as possible that our country will be able to find a balance and regain its innovative architectural environment.

S: Sociological (Sociological factors):
The sociological dynamics of architectural practice are fed by its social and cultural infrastructure. Determinants such as cultural trends, demographic structure, and population statistics are elements of the changing social structure. Utilizing the richness and productivity of the multidisciplinary structure of the architectural profession is only possible with the preservation of a rich, diverse, and deep-rooted social structure. At this point, actions that strengthen the social structure, such as a culture of empathy, respect for differences, and emphasizing qualitative and quantitative features other than standards, should be brought to the agenda in professional practice. The pandemic period has created significant changes in the social structure (changes in family relations, communication patterns, social structure, etc.). When we look at the spatial reflections of these changes, it is seen that there are consequences that directly concern architecture, such as housing space sizes, closed housing settlements, functional diversity in residential interiors, and isolated space needs. It is expected that the new actions and changing habits included in our lives with the pandemic will change the spatial design and cause visible breaks in architectural productions.

T: Technological (Technological factors):
The most tangible reflections of technological developments are seen in the profession of architecture. We see technological developments such as virtual reality systems, material and texture simulations, interior visuals, and software that draw the user into the interior visuals and designs, etc. We see these technological developments in both education and application areas. Even in recent years, the realization of congresses and symposiums in academic and scientific fields as online events, interviews, seminars, and live broadcasts over social media platforms show that digital technologies are becoming increasingly widespread.

Virtual exhibitions, digital festivals, and online workshops show the path followed by architecture and the digital axis it follows.

Developments within the boundaries of the field of technology have changed the way architecture is defined and its boundaries. With these developments, spaces and designs have become available on digital platforms at a level that can be perceived as realistic physical environments. Designers have disagreed on the use of traditional and digital means of expression due to the level of impact of digitalization on the design process. Some designers state that the design would not be complete without traditional methods and that digital expression tools can only be used as a presentation technique.

E: Environmental (Environmental factors):

Environmental factors have always been the most important factor affecting architecture. Criteria such as the efficient use of natural resources, shaping according to climate and geographical data, and the use of local materials have affected the practice of architecture both environmentally, socially, and economically. In particular, the rapid depletion of natural resources has become the most important issue in the architectural sector. Ecology and sustainability have become the primary criteria in today's architecture, overriding function and aesthetic concerns. In this context, social science, sociology, science and biology, genetics, energy, and its efficient use have become the universe of architecture.

L: Legal (Legal factors):

Existing legal regulations include zoning laws, architectural policies, ethical rules, and legal processes. The architecture sector, as a professional field that is primarily affected by zoning regulations, has to follow the laws and regulations, monitor the reflections of new decisions, and be aware of the effects of the decisions taken in the country and world politics on the practice of architecture. In this context, legal factors added to the PESTEL analysis are a binding and effective factor in the strategies to be followed by the sector. It is clear that the current legal regulations will not only answer the question of what kind of architecture but also affect the answers to the questions of what kind of environment, what kind of city, and what kind of life.

8. Discussion and Conclusion

As a result of all PESTEL Analysis findings, it is seen that the practice of architecture progresses and is affected by political, economic, social, technological, environmental, and legal factors. In this context, the profession needs to cooperate with other disciplines to strengthen its impact values and develop its dynamics.

The courses on labor and zoning law, urbanism, and architectural history in architectural education are the pool of knowledge that feeds the practice of architecture in the political, social, and legal sense, which have to be kept up to date. Building physics, materials, building elements, and structural courses, on the other hand, are courses that feed architectural practice in environmental, economic, and technological terms. When considered strategically, it is seen that architectural culture and relations with other disciplines remain only in the context of elective courses and are not sufficiently included in the curriculum. It is these social, cultural, and artistic sub-disciplines that underlie the ability to see the practice of architecture as a profession that is constantly active and preferred in new and current fields. Through the use of these data in creative fields in architectural education and practice, it is aimed to have reached a professional practice that constantly renews itself.

The answers that can be given to the questions from an architect's perspective will determine new paths in the adventure of architecture from the past to the future. Generating questions, developing ideas, and solving problems, which are at the core of architecture, will always remain the same. But what changes are the form and content of the questions and the way of asking them? In this context, it is necessary to look from a broad framework with an interdisciplinary perspective and to seek and produce answers in design balance without losing the essence of architecture.

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