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ARCHITECTURE, PLANNING AND DESIGN

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## Chapter 11

**THE SCOPE AND DEVELOPMENT OF  
DISCIPLINES, MULTIDISCIPLINARY,  
TRANSDISCIPLINARY AND DIGITAL  
HUMANITY CONCEPTS IN DESIGN  
EDUCATION**

*Ceyhun ŞEKERCİ*

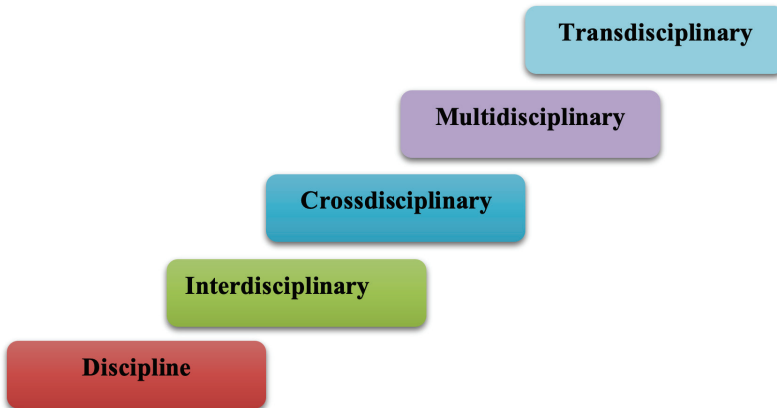
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## 1. Introduction

In recent years, with the increase in information access and methodological changes in research, the use of multi-disciplinary knowledge has gained importance as well as the use of one-way disciplinary knowledge in problem solving in the design process. Although most of the researches in the field of professional and design education seem to proceed through a single discipline, there are studies that contribute to and benefit from in different disciplines (Piaget, 1972). Based on this idea, defining the discipline and looking at the relations between disciplines will facilitate the formation of the interaction that is or will be established in the design processes.

With the participation of digital technologies in the design processes, it can create an understandable approach by producing practical solutions to design problems that had a complex structure before. In addition, thanks to the opportunities provided by digital technologies, it has made it possible to evaluate different disciplines in the field of design with a holistic approach.

In this study, the definitions of the concepts of disciplinary, multidisciplinary, transdisciplinary and digital humanities were made and their place in the historical process, its educational and professional development, its past in the fields of design, differences, similarities and breaks from each other were examined.



**Figure 1.** Schematic development of the interdisciplinary relationship

## 2. Concepts

In this section, the definitions of disciplinary, multidisciplinary and transdisciplinary, digital humanities concepts are made, its past in the field of design, its place in the historical process, its educational and professional development, differences, similarities and breaks from each other are examined.

### 2.1. Discipline

#### 2.1.1. Definition of Discipline

The word ‘discipline’, which is of Latin origin, was used in the sense of education and knowledge, and pointed to the manners of learning. Firstly, it was also used in the sense of forcing people to obey the rules by punishing those who do not obey the rules. The common point in the definition used within the scope of our research is to point out the relationship of the discipline with “knowledge, scientificness, scientific methods”.

The Turkish Language Institution defined the term discipline as “the whole of the knowledge that is or may be the subject of teaching, the branch of science”. Discipline is a research area that has its own content, methods and infrastructure, can produce knowledge in the field of study and has proven that it can further develop this knowledge (Berger, 1970).

Piaget, on the other hand, defines discipline as a field that has a history, procedures, methods and is self-contained. Generally speaking, it can be said that a discipline is a field that determines its own terminology, problems, methodology and content (Ulusoy, 2007).

#### 2.1.2. Key features of the discipline

**Table 1.** *The defining criteria of the disciplines are given in.*

1.	In a discipline, there are specific elements that include thought production such as concepts, forms, propositions, harmonies, rhythms.
2.	A discipline has followers and history.
3.	A discipline has its own specialized language.
4.	A discipline has its own social fabric.
5.	A discipline has an area of dominance on which the interests of its members are focused.
6.	A discipline has methods to test not only content but also hypotheses.
7.	The principles, premises, cognitive values and assumptions of a discipline form a coherent whole.
8.	In a discipline, new definitions can be brought to old concepts and new concepts can be produced as needed.
9.	There is communication between members of a discipline.
10.	Members of a discipline can communicate in environments such as conferences, symposiums, congresses, panels.
11.	A discipline develops educational tools and processes to promote and disseminate itself to the world.

### 2.1.3. Development of the discipline in the design profession

At the core of the design discipline areas; spatial planning, design art and culture. Since this art and culture includes contemporary educational and professional responsibilities for the continuous construction of not only structures but also changing and transforming national, regional and urban relations; It is also clear that building-space design, urban planning and landscape design, and the necessity of language unity taking into account the different scales and qualities of interior design.

The housing need of the society makes it necessary to design a space. In line with this need, the primary goal is to shape and evaluate the space according to the needs of the user. Interior architecture-architecture fields are design disciplines that create and organize space by meeting these needs according to comfort and aesthetic values (Demirarslan 2006).

In the discipline of interior architecture, a designer designs the building and equipment elements in the interior in detail, taking into account the needs of the users and taking into account today's requirements (Kazamia and Kafaridou, 2010). Although the discipline of Interior Architecture is a new discipline, it also explores material color and texture preferences, as well as providing physical comfort such as lighting, acoustics and air conditioning (Figure 2).

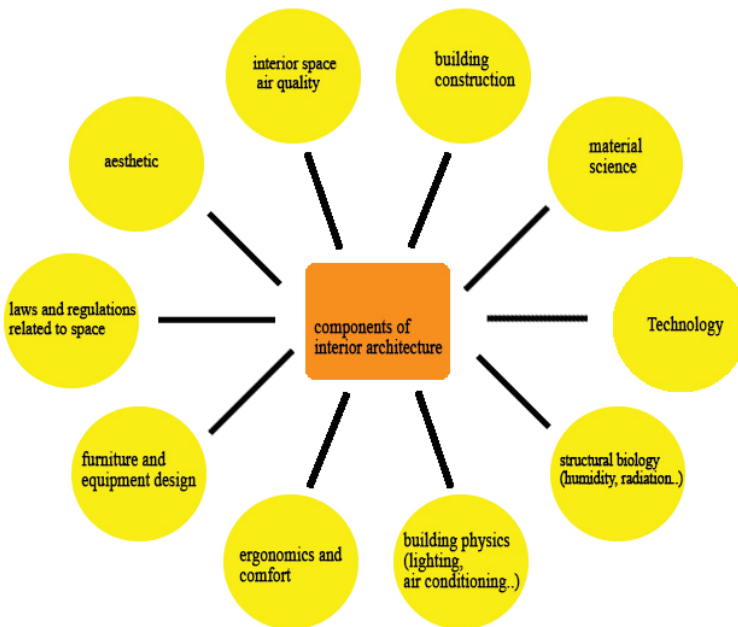


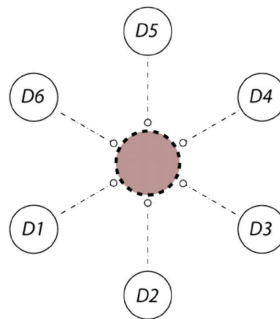
Figure 2. Components of interior architecture as a design discipline

The discipline of interior architecture, which is a new discipline, has led to the emergence of new concepts as a discipline that has been influenced by the innovations brought by technology and increasing environmentalist approaches since the second half of the 20th century. Some of these concepts are sustainable space design, parametric design, computational design, ecological space design.

## 2.2. Multidisciplinary

### 2.2.1. Definition of Multidisciplinary Concept

The concept of multidisciplinary, which emerged with the change of the term interdisciplinary over time, is defined as the coming together of more than one discipline on a single subject (Aktan, 2007). Multidisciplinary is also defined as everyone doing their own job on a common event or issue and not being interested in the work of another (Petrie, 1976). In the multidisciplinary approach, individuals who specialize in parallel or different disciplines are in minimal relationship to solve the problem or event, even if they do not interfere with each other's work.



**Figure 3.** *Example of a multidisciplinary diagram*

In multidisciplinary studies, the target determined in the study to be achieved is divided into more than one sub-discipline and shared in accordance with the disciplines of the experts (Figure 3). Disciplinary experts, who have different disciplinary knowledge, try to reflect the knowledge they have reached with their disciplinary expertise. Experts convey information by working only on issues related to their discipline. In multidisciplinary studies, the aim is not to open new fields, as in disciplines, but to produce solutions and reveal knowledge by coming together of more than one discipline to the existing problem. The characteristics of the multidisciplinary approach are given in Table 2.

**Table 2.** *Features of the multidisciplinary approach*

1.	Several disciplines work together.
2.	Individuals with different fields of expertise can work independently of each other, as well as sequentially or in parallel.
3.	Individuals with different fields of expertise are responsible for their own disciplines.
4.	Individuals with different expertise have different roles.
5.	Each discipline has a different goal.
6.	Each discipline has its own limits and should not be ignored.
7.	It is additive, integrative and collaborative.
8.	It is externally dependent.
9.	Each discipline has its own methodology.
10.	It teaches information about each discipline.
11.	Uses complementary information and perspectives to address a question.
12.	Different disciplines approach the event / situation from their own perspective, each according to their own skills..
13.	The result is the sum of the individual parts.

There are certain differences between a multidisciplinary and disciplinary approach. These differences are listed in Table 3.

**Table 3.** *Comparison of disciplinary and multidisciplinary concepts according to criteria*

<b>Comparison Criteria</b>	<b>discipline</b>	<b>Multidisciplinary</b>
<b>Scope</b>	Education and research are conducted around a single discipline.	Education and research are carried out by making use of more than one discipline.
<b>Compromise/ deepening</b>	There is specialization and deepening on a single discipline.	It is believed that it will be much more useful to use different disciplines while analyzing any subject or problem.
<b>Methodology / method of analysis</b>	Microanalysis and reductionist approach are dominant in education and research.	Macro analysis and inclusive approach dominate in education and research.



<b>innovation/ creativity</b>	It is believed that the externality effects of innovation and creativity that may arise in a discipline are strong and that other disciplines will benefit sufficiently from these external benefits.	There is a belief that an interdisciplinary approach will yield much more successful results in terms of innovation and creativity.
<b>Problem solving</b>	The problem is analyzed around a single discipline and a solution is produced.	The problem is analyzed around more than one discipline and solutions are produced. Or experts from different disciplines come together in the same team and try to find solutions.
<b>Synergy</b>	Since integration with other disciplines cannot be achieved, the level of synergy is low.	A high synergy is achieved by the integration of different disciplines. There is a lot of synergy to be gained as the understanding of “team work” is adopted.

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### 2.2.2. The development process of the multidisciplinary approach

The first work on the multidisciplinary approach is seen in Plato’s *Politeia*. According to his ideas, progress in human learning can develop with blended units. In the course of time, ideas supporting this view have been put forward. Rousseau claimed that learning that takes place in an environment isolated from the environment by making use of only the book in education is different from the real world, irrelevant and meaningless. In Russian psychologist Vygotsky’s social learning teaching, interactions between disciplines and Gardner’s theory of multiple intelligences helped explain the multidisciplinary approach (Hayles, 2015).

Contemporary understanding of science has made it necessary to be multidisciplinary in many fields. The concept, which was at the core of the Renaissance period in the past, today constitutes the most important mechanism and ideology that contributes to the development of science and technology. Since the 2000s, a multidisciplinary approach has been taken as a basis in the fields of medicine, health, engineering, architecture and design. In the multidisciplinary approach, the event or situation is no longer just a branch of science. With the multidisciplinary approach, the understanding of creating common solutions between the humanities and technical sciences has begun to emerge (Adams and Forin, 2013).

There are two main reasons for the need for a multidisciplinary approach.

1. Differentiation of the individual's way of perceiving the world
2. Emergence of new fields of work

From a psychological point of view, the way an individual perceives the world is important. While trying to perceive the outside world, the individual mostly uses the knowledge and skills of different disciplines while seeking solutions to the problems they encounter. Therefore, a multidisciplinary approach is important. Education, research and practice, which are organized only with a disciplinary approach, connect with real life, but they cause difficulties in combining information and using it, it becomes unpleasant and boring, and reduces the motivation of the individual.

The emergence of new fields of study requires the formation of different knowledge and the renewal of existing knowledge. In a space design, the relationship between the discipline of interior architecture, working with other disciplines such as architect, electrical engineer, mechanical engineer, graphic designer, industrial engineer has developed and has created a new interdisciplinary research topic. It is impossible to examine these emerging new fields within the narrow scope of traditional disciplines. In a sense, the multidisciplinary approach is formed naturally as a result of the development of different fields.

### **2.2.3. Development of a multidisciplinary approach in design education**

Multidisciplinary studies, the importance of which was recognized in the 20th century, emerged in design education with the design concept after 1950. Along with innovative searches in the field of design, the approach of new design schools has accelerated the spread of multidisciplinary understanding. Design discipline has become a concept associated with the term multidisciplinary in the 2000s (Trummer and Lleras, 2012). Because designers should be expected not only to design the form of the product, but also to be experts in areas such as presenting, producing, selling, marketing and distribution of the product they designed. However, it is not correct to expect the current design discipline to dominate this area alone. In this context, it should be important to eliminate this deficiency by exchanging information from other disciplines (Özcan, 2011). In this case, the necessity of multidisciplinary work arises.

Most of the interdisciplinary relations used in the field of design education in the world are encountered. Rensselaer Polytechnic Institute, one of the notable interdisciplinary programs in the field of design, is the De-

sign, Innovation and Society program, which provides a BS degree. The program consists of a series of studio lessons that include the multidisciplinary work of the students. The program not only provides solutions to the design problem in the studio courses, but also provides the integration of the humanities and social sciences with technology into the courses. It is seen that the program, which supports the studio courses, integrates with a perception that covers the whole process from a new product design to the marketing of this product, the design and the user.

The multidisciplinary education approach of design schools in the USA enabled the art to become stronger after 1950 (Trummer and Lleras, 2012). The proliferation of creative design practices with experimental approaches in design education has also increased the interdisciplinary and multidisciplinary practices of interdisciplinary art (Öztürk, 2016). “Carneige Mellon University” in the USA is one of the important schools that provide multidisciplinary education at the undergraduate level in the field of design. Different disciplines in the field of fine arts form a joint program at the school. These programs are humanities, social sciences, science, computer science, and arts programs. Programs are defined as interdisciplinary programs. Students can choose courses from five different schools: fine arts, architecture, art, design, drama and music.

At the summit of the Danish Design 2020 Committee, it was discussed that cooperation with the humanities, social sciences and sciences should be done in order to bring a multidisciplinary approach to design students (The Vision of the Danish Design 2020 Committee, 2011). It has been concluded that design, which is among the basic disciplines due to its multidisciplinary binding role, should be included in all other disciplines.

Multidisciplinary changes in design education have not only been in the form of curriculum renewal and creating programs, but have also led to the opening of different universities. One of these universities is Aalto University in Finland. This university is the first established interdisciplinary university (Restarting Britain Report, 2011)

In line with the multidisciplinary approach in France, the Paris-Saclay Campus will be established in 2020. This campus is planned to bring together 22 universities and research institutes. The campus is organized to serve approximately 20 thousand personnel and 30 thousand students. The aim of the developers of this campus is to create the first community of people who are leaders, talented and committed to innovation by combining university campuses at a multidisciplinary level (Öztürk, 2016).

In order to reveal the multidisciplinary approach, new universities are established in some countries, while in some countries cooperation between universities is made. In Australia and Hong Kong, institutions

with intensive research across disciplines cooperate with institutions with less research (Kazamia and Kaforidav, 2010).

Similar approaches have begun to be tried in faculties providing education in the fields of design in our country. In the departments of Interior Architecture and Industrial Design at Istanbul Technical University, Mimar Sinan Fine Arts University, Bahçeşehir and Doğuş Universities, a common curriculum application was carried out at a rate of 14-18% in certain periods, especially in the first grades.

In the first year at Maltepe University, the departments of Ship and Yacht Design, Architecture and Interior Architecture provide education together, in the second year, the departments of Architecture and Interior Architecture work together, and from the third year, each department continues their education with their own studio studies and theoretical lessons. In addition, interior architecture education progresses depending on the architecture curriculum (Ulusoy, 2007).

In addition, it is seen that architecture and design students take courses from different disciplines in graduate programs in order to catch a multidisciplinary perspective in our country. In this context, designers try to provide versatility with interdisciplinary communication in design education by getting support from not only technical sciences but also experts from disciplines such as art, graphic design, communication and law.

Flexibility in design education applied in our country and especially in developed countries, education in others from different disciplines, horizontal-vertical transitions, joint education programs between countries, workshops, conferences, meetings offer a perspective where both the specialization increases and the relations between the branches of science intersect in very different fields.

**Table 4.** *Characteristics of students who have a multidisciplinary approach in design education*

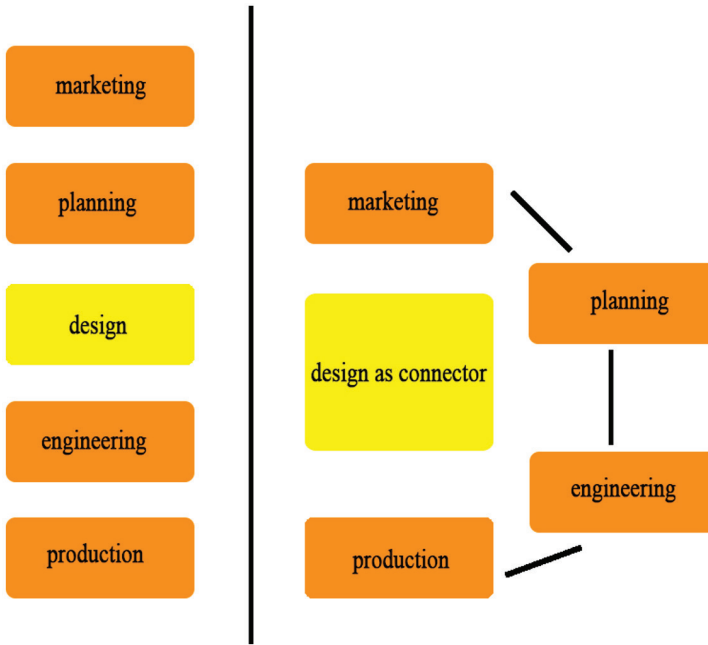

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1	Student interprets indoor and outdoor space according to new developments.
2	Evaluates the design problem from multiple perspectives.
3	Monitors and interprets professional developments.
4	Establishes relationships with different disciplines.
5	It adopts teamwork and team understanding.
6	Analyzes information correctly.
7	She thinks artistically as well as technically.
8	She transfers her thoughts to reality in line with the possibilities and needs of the society.
9	Mutual respect develops between the lecturer and the students.
10	Students develop the habit of questioning “why” before accepting a thought or a proposition.
11	Can think more creatively, uniquely, and unconventionally.
12	The ability to synthesize and integrate develops.
13	Develops listening ability.

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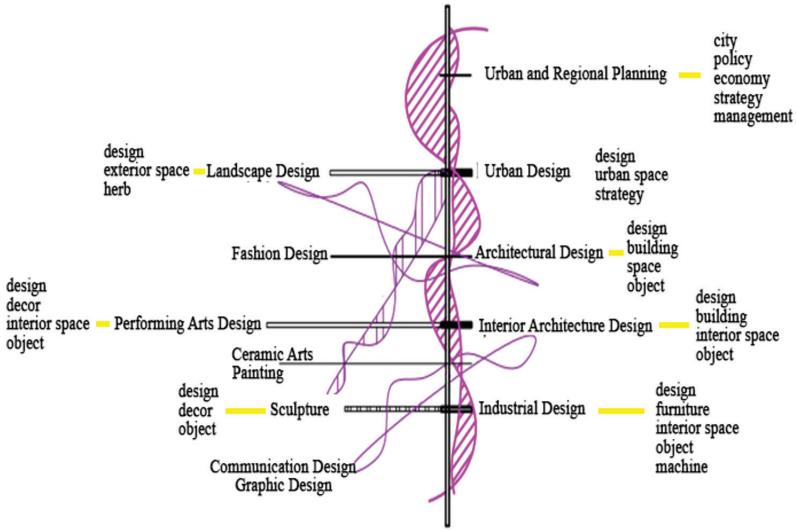
#### **2.0.4. Development of a multidisciplinary approach in the design profession**

With the developing technology, the design that directs human life includes different disciplines. Architectural design, space design, graphic design, fashion design and industrial design are just a few of them. In the traditional approach, the designer gave priority to functionality and form in the product, no matter what field he served (Choi, 2006). Today, the designer has moved a little further away from the design of form and functionality and has turned to an approach where the meaning and communication of the product are at the forefront. Therefore, it has become a multidisciplinary discipline by assuming a binding role between different disciplines (Figure 4).



**Figure 4.** *Past (left) and future (right) role of design*

If we refer to the design-oriented professions from a wider perspective, starting from the planning-based disciplines, the vertical relations created by the branches of urban design, regional and urban planning, architecture, industrial design, interior design allow studies at different design scales. We can also talk about an association that changes according to the requirements with performing arts design, graphic design, communication design, fashion design, landscape architecture, and classical art branches such as ceramics, painting and sculpture. In other words, we can talk about a big picture consisting of a multidisciplinary and transdisciplinary platform (Figure 5).



**Figure 5.** *Space spiral: Multiple expressions (Ozmen, B and Yanar, S; 2016)*

The post-modern values of the digital age, the emergence of flexible and anti-hierarchical systems, multiple perspectives require us to adopt a more sensitive approach to the problems brought about by specialization in design disciplines. In the fields of design, an approach that starts with design and carries out a multi-faceted discipline together in the process is observed.

## 2.3. Transdisciplinary

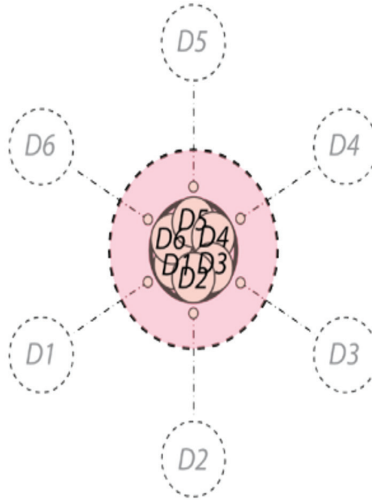
### 2.3.1. Definition of the concept of transdisciplinary

The suffix ‘trans-’, which comes from Latin origin, gives the meaning of “beyond -” to the word it comes before. With this word, it is meant to go beyond an existing border. With this approach, the term ‘transdisciplinary’ is expressed as going beyond disciplines.

The concept of transdisciplinary aims to bring people from different disciplines together at a common intersection point about the problem, and it aims for each discipline to offer its own solution. It can also be considered as the transdisciplinary approach and the introduction of different proposals to the same situation, even if the disciplines do not intersect.

Transdisciplinary studies try to go beyond disciplinary perspectives by combining the intellectual frameworks of different disciplines. In these studies, disciplinary information is placed on top of each other in the same

center, evaluated from a new point of view, and integrated into processes (Figure 6). Therefore, transdisciplinary studies come into play in areas where problems or researches that transcend two or more disciplines are the subject.



**Figure 6.** *Transdisciplinary working processes*

A stronger centrality and holistic research process can be mentioned in transdisciplinary studies. It provides a different perspective on the study by revealing new research on disciplinary knowledge.

### **2.3.2. Development of a transdisciplinary approach in design education**

The transdisciplinary approach aims to provide unity, harmony and order by linking the influence on the verticals of the education system. Many studies fail to progress due to lack of coordination. However, this situation can be overcome by transdisciplinary. Harold Linstone proposes a multidisciplinary educational stratification in design education. With the students trying to establish interdisciplinary connections with their own efforts, the progress in the design processes of the students will take a structure that cuts the disciplines in a systematic structure. Beyond the aim of multidisciplinary, some limited interdisciplinary normative experiments with the systematic coordination of multidisciplinary in the stages of design education cannot be included in the discussion of university reform. Because the new aims of universities have not been clearly defined. The basic structure of transdisciplinary education can be understood in terms of the back interaction between education-research and service fun-



ctions. This approach can basically be expected to bring a new perspective to life sciences regarding human and environment interaction.

### **2.3.3. The development of a transdisciplinary approach in the design profession**

The increase in interactivity that has developed with the modern period has in recent years not only been a structural discipline in the field of design engineering, but the development of digital technologies and its inclusion in the field of design has now gone beyond interdisciplinary interaction and prepared the importance and environment of interdisciplinary work instead of multidisciplinary work in design processes.

The idea of creating a sustainable world in the field of design with the effect of global warming allows it to contribute to the development of smart building technologies by including engineering fields in the field of design, beyond being just a design discipline in the field of architecture. In this way, ecological green architecture constitutes a transdisciplinary approach under sustainable architecture, due to the development of the field of sustainable design.

In parallel with these developments, it is emphasized that a design profession will emerge in the future that will unite all these specialized professions such as mechanical construction and electrical engineering, in addition to professions such as the design discipline architect and interior architect, under a single roof (İmamoğlu, 2011).

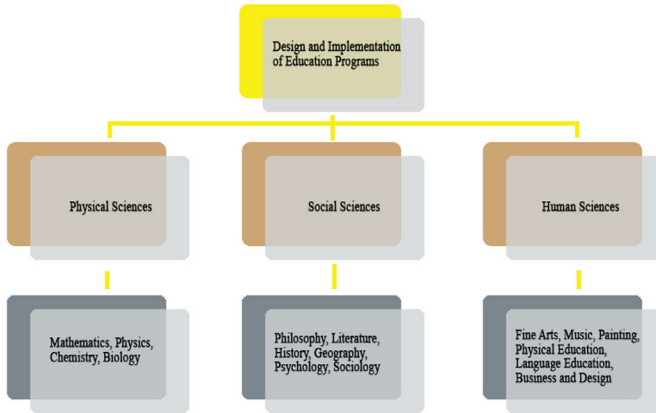
## **2.4. Digital Humanities**

### **2.4.1. Definition of Digital Humanities Concept**

“Humanities”, which has Latin origins, are defined as academic disciplines that study human culture. Anthropology, geography, music, philosophy, religious education, linguistics, visual arts constitute the humanities (Figure 7). Humanities in the 15th century; It was a course consisting of ethics, history, poetry, rhetoric and grammar philosophy. With the introduction of the computer into daily life, the humanities wanted to expand their research methods with computer-aided approaches. Digital Humanities studies, which emerged in the 1960s, have turned into a new field of science today.

Experts in the humanities field have developed numerous large and small scale numerical design tools. Their aim is to present and visualize new data obtained from research. They carry out this activity under the name of digital humanities.

The main topics of Digital Humanities are text analysis, digitization and data mining. In addition, issues related to data processing methods are also included in the scope of digital humanities. These topics include image analysis, complex network analysis, and spatial humanities. With these approaches, striking visualizations can be prepared with different techniques in order to examine works of art, texts, ideas, cities and people.



**Figure 7.** Schematic representation of training programs

Humanists need to embrace the methods hidden behind the word ‘digital’ and learn a different way of thinking in order to use computer-based methodologies. All successful digital humanities studies include asking questions posed by the humanities in a way that can be answered by numerical methods (in a sense, their translation into digital).

### 2.4.2. History of Digital Humanities

In the West, the study of the humanities can be traced back to ancient Greece as the basis for a comprehensive education for citizens. In Roman times, the seven liberal arts concepts included grammar, rhetoric, and logic, along with arithmetic, geometry, astronomy, and music. These subjects opened up skills or ways of doing to humanity and formed a large part of medieval education.

With the Renaissance humanism of the fifteenth century, with the transition from classical fields to fields such as literature and history, a significant shift occurred when human practices began to enter the subject of study rather than practice. In the twentieth century, this view began to be questioned by the post-modernist movement, which sought to redefine the humanities in more egalitarian terms appropriate for a democratic society.

### **2.4.3. Development of digital humanities in design education**

The development of digital technologies and environments has enriched the possibilities of information search, access, use, production and transmission. Libraries, which are considered as cultural memory institutions that protect and present information resources from the past to the present, transfer them to future generations, have also transferred their collections to digital environments with the effect of these continuous developments and user needs. In this context, libraries have intensively focused on digitization studies and have started to offer digitalized information resources through various information systems. These efforts, especially to increase the visibility and use of information resources, directly affected the studies carried out in the field of humanities; It has brought about the formation of an interdisciplinary structure called “digital humanities”, which is based on the analysis, interpretation and re-creation of the information obtained from digitized content with the help of various tools and equipment. This emerging structure has brought a new dimension to the information organization, classification, access and protection/storage functions of libraries.

### **2.4.4. Development of digital humanities in the design process**

In the traditional design process, where computer technologies are not used, designs are made on paper, and after the design reaches a certain stage, communication with different disciplines (civil, mechanical, electrical engineers, etc.) is provided (Figure 5). The designs are reshaped in line with the decisions made by different disciplines. This means both a waste of money and a waste of time. In addition, retrospective revisions prolong the design process and make more mistakes.

Nowadays, designs are made in computer environments. Computers are preferred more in terms of time, speed and economy. In addition, it requires less labor and reduces drawing errors compared to traditional methods. Thanks to the preparation of designs in digital environments and developments in communication technologies, the interdisciplinary design organization is also changing. There are different disciplines in the period from the beginning of the design to the completion of the design.

The healthy execution of the design organization in the digital environment is possible with the efficient use of technological opportunities. A number of problems are encountered in organizations that do not have sufficient technological equipment and knowledge. In the design process, in relations with other knowledge disciplines such as engineering fields,

the use of computer software, graphic standards and coordinated communication concepts come to the fore. The most common problem in today's business organizations is seen as communication problems with the use of different software and different standards. In order to rationalize these problems, the use of interdisciplinary standardization and common software and the use of appropriate communication methods gain importance.

### **3. Conclusion**

From the study data, it has been seen that multidisciplinary and transdisciplinary concepts have begun to take place more systematically in the world of education and science in the 21st century. The research and education system based on specialization on a certain discipline in the field of design has gradually reduced its importance and left its place to multidisciplinary research and education.

Today, designers are expected to specialize in many subjects. This situation enables the design discipline to interact and communicate with other disciplines and brings an interdisciplinary approach in design education. Multidisciplinary interaction will make it easier for the designer to reflect his talent and originality, feed the design process and allow new experiences to emerge.

Fields such as digital humanities, business and engineering are included in design education, undergraduate and graduate programs are carried out jointly with different disciplines at the global level, and multidisciplinary universities are established. In our country, current educational practices in design education are reviewed, interdisciplinary graduate programs are opened and undergraduate programs are branched out. The development of policies in order to contribute to the design discipline and design education in many countries, and the receipt of positive notifications as a result, causes us to question how much support is given to design in our country.

### **Recommendations**

- Design education should be given not only in fine arts and architecture faculties, but also in faculties of other related disciplines (humanities, business administration, engineering, etc.).
- Instead of opening new undergraduate departments in order to have a better quality education, design departments are integrated within themselves or with different departments; Interdisciplinary institutions can be created with multidisciplinary work.

- The number of graduate programs can be increased in order to support newly opened undergraduate programs.
- Applications (virtual design studio) where technology is integrated into design education can be increased.
- It is reported that design applications focus on people in the future, so a program should be created with genetics, medicine and biological sciences.

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