

# Terms and Concepts on Design Studio in the Research Articles of 2010's

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**Abstract:** Studio approaches change over time due to changes in the areas and concepts associated with design studio. What is the direction of this change and which areas came to the forefront? The theoretic base of this article gives a short history of design in different fields and also changes in the understanding and the approaches in design studio throughout history. In this article, first we define basic approaches realized in the last century. Then, we seek to investigate the concepts and topics around design studio term analyzing all articles that mentioned "design studio" and "design education" in the title and keywords in the last decade. For this purpose, we listed around 500 words and concepts in 262 SCOPUS indexed journal articles published between 2009-2019 and found the most repetitive words. We determined their proportions within the total and investigated their connections and networks. By using network analysis, we tried to construct focus areas, relations and connections between words terms and concepts related to the recent approaches in the design studio field. The terms and concepts also ranked according to years-based changes. We found that some concepts are becoming more popular or less popular in yearly based ranking of terms and concepts. The research findings of the article show that design studio education had trends on being more locally identical, more systematic, interdisciplinary, process oriented.

**Keywords:** Network Analysis, design studio, article, last decade

## Introduction:

The design studios accepted as the backbone of the curriculum in many design education programs at university level, like architecture, interior architecture, landscape design, urban planning, urban design and in all type of design disciplines. Design studio by definition is a space where design processes are realized. Design studio, in any type of education, occurs as a type of course in which design education by practicing to work on some design problems or some environment or media starting from simple problems and ending with a very complex one to give ability of designing environment, building, space, product, system, interaction, graphic, media, communication, and related activities. Design studio courses generally based on design problem solving or working on a special place to find correct improvement on design issues of that special environment. These are sometimes may be one long term assignment, sometimes multiple

problems given in the design studio. Design education in design studio considered as an organism which has a culture which should be established and defined by the stakeholders like students, instructors, related sector representatives, administrative people of schools. Architectural design studio culture is considered as an important part of educational philosophy of schools of architecture starting from late 1990's in USA (Hacıhasanoğlu, 2019). The starting point of design studio may be considered as *Ecole de Beaux-Arts* (Drexler, 1984). Before design studio education the educational system of many design disciplines including architecture was organized in guild organization as a part of master-apprentice relations-based education.

The nature of the contemporary design studio is consistent with the model of teaching exemplified by Plato, who encouraged the free, independent exchange of knowledge and

information. He brought disparate thinking into a forum of discussion, much like that experienced in a modern-day studio. His model of teaching became known as Platonism and his community of scholars referred to as Academy (Pevsner, 1940). In Italy, during the latter part of the 15 Century, a large number of schools flourished based on humanistic discourse; a free, sociable and informal means of discussion so vastly different in nature to the scholastic pedantry of the universities of that time. These schools later came to be known as *Accademia Platonism* (Green, Bonollo, 2003).

The first implementation of the design studio in architectural education came from 1819 when the classical atelier system of the French Royal Architectural Academy transformed into *École des Beaux-Arts*. *Académie des Beaux-Arts*, founded in 1648, as it developed it played a most consequential role in European architecture. The *atelier* system in the *Beaux-Arts* program not only aimed to improve “artistic” but also “analytical and structural thinking skills” of the students (Drexler, 1984). At the *École des Beaux Arts* a student was admitted to the atelier of one master, and stayed there throughout his or her education (Goldschmidt et al., 2010). Undoubtedly compared to the traditional teaching methods, the framework that contemporary design studios of architectural schools present worldwide is a very different one. The curricular structure of the *Beaux-Arts* School was twofold: practical and formal, in which the design studio was not central but lateral. The practical education was more like a craft training in which the students were learning to work with different materials such as stone, timber, metal, clay and glass. The formal education concentrated on the problems of architectural form through observation, representation and composition, and introduced the theories on space, color and design (Balamir, 1985). In this two sections structure, particular knowledge was gained by means of certain skills, i.e. learning materials by giving form to them, learning geometry, color, space and structure by drawing, painting and model making.

Currently the student comes across at least 8-10 studio tutors during their academic program (Ciravoglu, 2014). Design studio and atelier of

design and art education had been continued in the following years in different schools like Bauhaus, Mackintosh School and others. Since the Mackintosh School was founded in 1845 as one of the first Government Schools of Design, as a center of creativity promoting good design for the manufacturing industries, its role has continually evolved and redefined to reflect the needs of the communities, embracing in the late 19th century fine art and architecture education and today. Mackintosh was one of the most influential designer-architects of his generation. Born in Glasgow in 1868, he was central to the development of a unique *Glasgow style* in the arts; a style that was to be Scotland’s response to the art nouveau movement. However, with his design for the Glasgow School of Art, in particular, he is also rightly revered as one of the early pioneers of modern design of the 20th century.

The Weimar Bauhaus School, established by Walter Gropius in 1918, based on an educational style of “architectonic approach” to architectural education covering various branches of art and design within a vast perspective. “Focusing on three-dimensional perception in comparison to the two-dimensional compositional approach of the Academy, the Bauhaus School differed from *École des Beaux-Arts* by providing the students with an ability to unfold their creativity, imagination and personal expression” (Balamir, 1985). Gropius introduced the philosophy of the Bauhaus in 1919 by manifesting that “there is a close relation among all disciplines of arts and craft” (Benton et. al., 1975). The curricular structure of the Weimar Bauhaus School consisted of three periods:

*“Introductory Course introducing knowledge on form and composition, the General Course introducing knowledge on space and surface design as well as construction, and the Architectural Course focusing on steel and reinforced concrete buildings. While the basic knowledge on form, composition and color were introduced by means of analytical drawing, painting, observation and bodily performance during the Introductory Course, the advanced theoretical knowledge on space, material, function, economy and aesthetics were taught in*

*various theoretical and technical courses and the design studio in the Architectural Course*" (Salama, 1995).

The Bauhaus education may be considered as the basis of a design studio-centered education, in which the theory and the practice of architecture were integrated within an interdisciplinary environment. Compared to the two-sectioned formal and practical structure of *École des Beaux-Arts*, practical studies in material workshops of the Weimar Bauhaus School were closely integrated with theoretical studies of color, composition, construction and nature, especially in the last three years of education. Between 1930 and 1960, schools of architecture in various countries followed two different approaches: the two-sectioned formal-practical structure of *École des Beaux-Arts* in which *ateliers* were separated from theoretical courses and the three-staged Bauhaus system in which practical and theoretical studies were integrated in *ateliers*. The architectural education in the US had been under the dominance of *École des Beaux-Arts* until the foundation of the New Bauhaus School by Sibyl Moholy-Nagy in Chicago in 1936. As each student in the Chicago Bauhaus was required to take a two-year introductory education including basic design, analytical and structural drawing, model making and basic scientific knowledge, the integration of architectural theory and practice in the design studio seems to have started in an earlier stage than it did at Weimar Bauhaus.

Similar approaches were seen in other countries like Turkey. As a new system, the student has the right to work with different instructors in each project by selecting the workshop group that s/he wishes without depending on a workshop and the same teacher. The workshops that transformed into a professional competition environment with the new system, allowed the exchange of ideas between the larger working groups (Toprak, Hacıhasanoğlu, 2019). Beginning in the early 1990s, with the development of personal computers in the mid-1990s, design studios began to tend to more computer-aided design oriented and increasingly moved away from the academy education of master-apprentice relationship. With the effects of the design methodology that began to settle in the 1960s, instead of learning from the masters as in the academy education in

the studio approaches of *Ecole de Beaux Arts*, the structuring of the process and the defined methodologies, approaches and focusing solely on the master instructor began to develop in the design studios. These approaches have also been addressed by researchers in design science. Donald Schön has often argued that the professional education of architectural students – and other design students – should be aimed at making them into ‘reflective practitioners’ [Schön, 1984]. Design is focused on subjective creativity, but the positivist university paradigm is focused on objective rationality. In order for design education to become more rigorous – and more academically respectable – it must either become more rational or it must embrace a new paradigm that values creative experience.

In the USA, industrial-design education formally started at Carnegie Technical College (later to become Carnegie-Mellon University) in 1935-1936, under the direction of Don Dohner. This was followed by the Pratt Institute of Art in New York and these developments, together with those occurring in industry, served to establish the industrial design profession. Design education in this period grew from the demand for mass-produced products and the vision of design educators to delineate industrial design apart from architecture and engineering (Kaufman, 1999).

Figure 1. demonstrates us the timeline of different design studio trends and approaches other way of saying *ecoles* of different design studio implementations. It is started from 1930s with beaux-arts school of architecture which had two-fold structure, learning architectural design in atelier and learning different materials by working on these materials and the practicing materials supported by theoretical courses. Bauhaus school based of the educational approach of relations between arts and crafts. Therefore, design studio interacted with this idea of accepting arts and crafts interaction. Approaches of Bauhaus school starting from 1930s and affective in current design education partly. Process-oriented design approaches which had implementations of case problem model, analogical model and interactional model appear 1960s in design studio. Design research and research by design methods have been affective starting from 1960s and have been continued in

contemporary design studio approaches. After personal computers widely used in 1990s

computational design approaches, and related issues like virtual design studio, collaborative solutions in design and some experimental design approaches have been implemented in the design studio. After sustainability became very affective in all scientific areas, integrated design had been entered the design studio studies after 2000.

role in architectural education. Donald Schön defines architectural design a particular kind of inquiry, “a making of representations of buildings to be built”. This inquiry, he suggests, is “one derived from reflection on spontaneous knowing-in-action implicit in architecture making” (Schön, 1984). Therefore, he considers the architectural design process a “reflective practicum” in which disciplinary knowledge is produced through “reflection-in-action” in the design studio.

<b>Beaux-Arts</b> two-fold structure practical formal		
<b>Bauhaus</b> relations between arts and crafts		
1930	<b>Process-Oriented Design-critical inquiry</b> case problem model / analogical model / interactional model reflection in action	
	<b>Design research</b>	<b>Research by design</b>
1960		<b>Computational design</b> Virtual design, collaborative design, experimental design
		1990
		<b>Integrated design</b> paradigm of complexity reflective in action
		2000

Figure 1. Design studio history timeline.

“Despite the emergence of alternative studio teaching models such as the case problem model, the analogical model, the interactional model, etc. in the 1960s, as well as the Critical Inquiry and Process-Oriented Design Pedagogy in the 1990s, the current approaches to teaching architectural design continues to follow principles, rules, and practices developed under the influence of the traditional *Beaux-Arts* and *Bauhaus* models” (Salama, 2015). Design studio education in many schools of architecture around the world is characterized at two extreme poles, either abstracted from problems of the real built environment or directed towards the expectations of the construction sector, both of which reflect themselves in the acquisition of various knowledge and skills required from the students of architecture in traditional or critical models of education.

Contemporary scholars of architectural education approach the design studio from different theoretical and methodological perspectives, yet mostly defending its central

After Schön’s approach, it is suggested that the emerging “paradigm of complexity” for design studio education derived from complexity theory. Considering the design studio “the norm or status quo for design education practice”, Wang proposes a paradigm shift “replacing positivist theory with complexity theory, rethinking the epistemology of design, becoming more aware of the systematic processes of design, and integrating multidisciplinary approaches to design projects and activities (Wang, 2010). Some design studio instructors had the idea of reorientation of architectural design education toward an engaging policy that considers the social responsibility of architects. This idea followed by “an integrated design paradigm” in which rational problem solving and reflective-in-action are integrated within the design process (Bashier, 2014).

Some researchers make comments on the role of the studio by providing emphasis on knowledge production regarding various areas of the built environment. The current culture of architectural education “socializes its members

through high emphasis on form and abstract aesthetics while superficially adopting fragmented pieces of knowledge on technology, ecology, social sciences, sociopolitical and socioeconomic aspects” and that the impact of this culture on students could be observed in their lack of communication with public, testing hypothetical solutions during design process as well as knowledge on technology, environment and users (Salama, 1995). To overcome this problem, he suggested a trans-disciplinary approach to architectural education, integrating three types of knowledge production: disciplinary, cognitive- philosophical and inquiry-epistemic (Salama, 2007, 2015). Some other researchers emphasized the lack of communication between stakeholders and teamwork skills in the design studio, which prevent the students from engaging with a changing society and developing a sense of community (Nicol and Pilling, 2000). It is proposed that a comprehensive approach that establishes an epistemological base for architectural education by means of research and a skill-based curriculum for schools of architecture, in which multi-disciplinary knowledge on architecture could be gained by means of intellectual, communication and social skills Richard Foqué (2011). He considers research by design “an essential cornerstone as it conceives possible realities, investigates their desirability, changes the existing reality by implementing a new one. Research by Design / Design Research: Bayazit (2004), associating Design Research with design methods, started the first-generation design methods in 1962 with Morris Asimow's “Introduction to Design”. Christopher Alexander's doctoral dissertation “Notes on the Synthesis of Form”, Chermayeff and Alexander's “Community and Privacy” is listed. H. A. Simon's first conference in the USA, The Sciences of the Artificial, he and his colleagues presented artificial intelligence (AI) at Carnegie Mellon University. Second generation design methods Simon is said to start with the above-mentioned book (Bayazit, 2004). The first-generation design methods were formulated and applied by scientists and designers. The objectives of the design problem also were identified by them during the design process, which caused rigidity in design decisions and unexpected failures. These simplistic methods were necessary at the beginning. Horst Rittel

proposed new argumentative methods as “second- generation design methods.” His methods, argumentative method, and IBIS (Issue Based Information System) were problem identification methods, which were influenced by the British philosopher Karl Popper. These second-generation design methods began to compensate for the inadequacy of the first-generation design methods

Computational Design: Some design and architecture schools still use manual techniques similar to those used at the beginning of the last century. For a long time, design studio activities were carried out using manual sketches, drawings and physical modeling. Since the late 1980s, architecture and architecture education has witnessed a significant transformation with the introduction of computers and information and communication technology (ICT), which have become widespread in all areas of practice and education. Many schools have increased IT content in their curricula and are investing in computing resources to enable their students to provide the necessary skills and competitive advantage. Modern information and communication technology and digital tools have been adapted to architectural education and practice since the 1990s. Computer Aided Design (CAD) has been adapted to architecture and has become the main working environment. CAD and digital media have also been adapted by many architectural schools around the world. The rapid developments in information and communication technology and its applications in architecture have created a new opportunity for studio teaching.

Integrated Design: Design Studio courses represent a studio-based training system in which subjects are handled in a process-oriented approach. Current technologies give more opportunities to integrate the processes of different works in different disciplines. Integrated architectural design process approach is one of the case for this integration in planning, design, construction phases of architecture and its stakeholder disciplines. Integrated Design Process (IDP) was used in the early 1990s, by Canada’s C-2000 program and IDEAS Challenge competition to describe a more holistic approach to building design. This design process has been shown to produce more

significant results than did investment in capital equipment. There is now no single “right” definition for IDP. Rather, IDP describes a different, intentional way of approaching sustainable building and community design that offers a much higher likelihood of success than any other approach (Zimmermann, 2006).

All these different approaches in design studio follow some basic concepts and terms in their active periods. The basic aim of the article to find to active terms and concepts of last decade in design studio by searching keywords, terms and concepts in the titles and text of scientific research articles published in the journals indexed in SCOPUS. We explain the materials used in the research and the methodology followed in searching the materials and the findings of the research are in the following part of the article.

### Methods and Datasets

This article seeks to discover how design education evolved in the last ten years. It aims to investigate the concepts and topics according to titles and keywords of the articles that mentioned “design education” and “design studio” in the last decade. For this purpose, we listed around 500 words and concepts in 262 articles in SCOPUS archive. We derived recurring keywords from the author keywords section, we determined their proportions within the total and in a yearly-based comparison chart. Finally, we investigated their connections and networks according to their meanings.

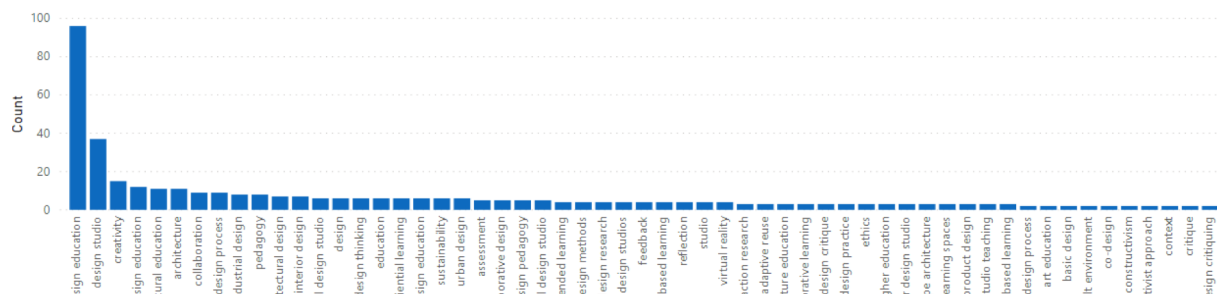


Figure 2. Most repeated words and concepts in the ‘design education’ articles between 2009-2019

The most repetitive words are arranged according to the frequency of repetition. With this method, we reveal the most used words and concepts in the research published in the last 10 years.

Figure 2. shows us most repeated terms and concepts: design education, design studio, creativity, architectural design education, architecture and collaboration are the most repeated words. The following keywords include many important keywords such as; design process, sustainability, design thinking, assessment, experiential learning which are seen as the valuable concepts for design studio approaches and applications. The second group also includes the professional backgrounds such as: architecture, architectural design, interior design, industrial design and urban design. The following third group of terms and concepts include collaborative design, design pedagogy, virtual design studio, blended learning, design methods, design research, design studios, feedback, problem-based learning, reflection, studio, virtual reality, action research and adaptive reuse. The fourth group of words and concepts consist of ethics, learning spaces, studio teaching, studio-based learning, basic design, co-design, context, critique and many others.

It is also important to see how the importance given to these keywords develop over the years. Therefore, we also assessed the repetition of concepts and keywords on each year. This investigation allows us to find out the popular terms in yearly basis. In this way, we determine the words and concepts according to their

priorities in different years, and it is also possible to track their popularity rise and decline.

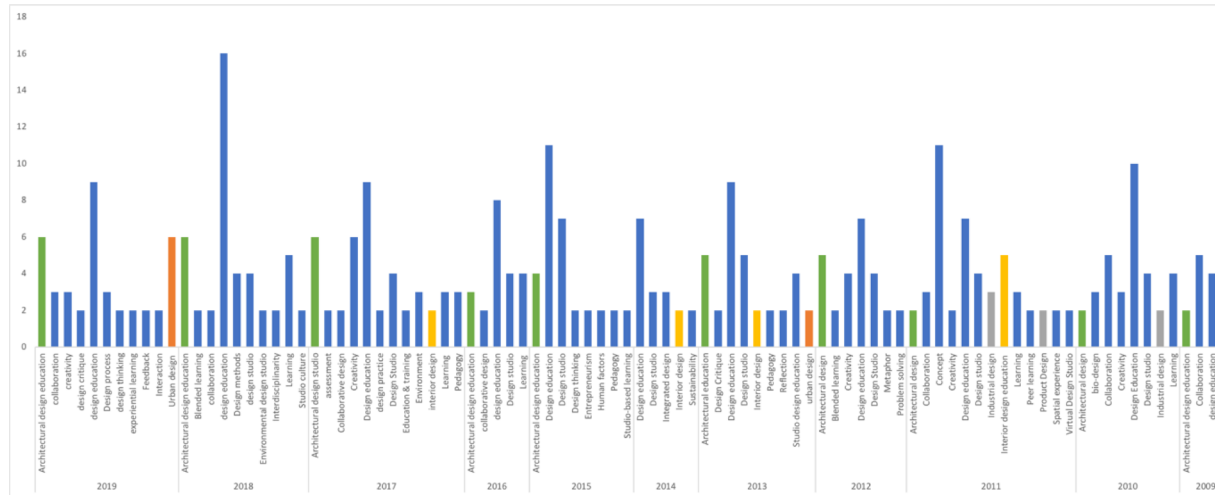


Figure 3. Most repeated words and concepts according to years.

Figure 3. shows how the keywords evolve through the last ten years in general. The most repeated concepts are design education, design studio, architectural (design) education, creativity and collaboration. These concepts are consistent throughout the decade. Some keywords have reached a peak at the year that they were used by many researchers: in 2010, 2015, 2018 and 2019 “design education” reaches a peak point. In 2011, “concept” is a very popular keyword.

Figure 4. describes how the design education keyword evolves during the decade. Because we used it as a keyword in the search engine, it appears as it is the most popular among the other keywords. It reaches a peak point in 2018, and it is consistently used during the decade. It seems that design education as a keyword is quite popular during the decade, but it is likely that research about design education is

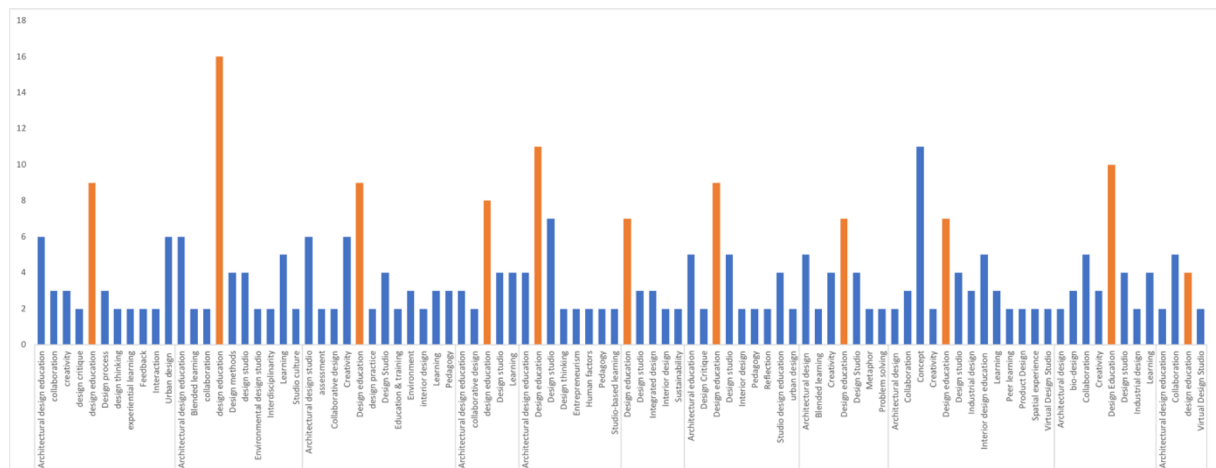


Figure 4. Design education keyword frequency according to years

becoming more popular towards the end of the decade.

profession group are not consistent throughout the decade.

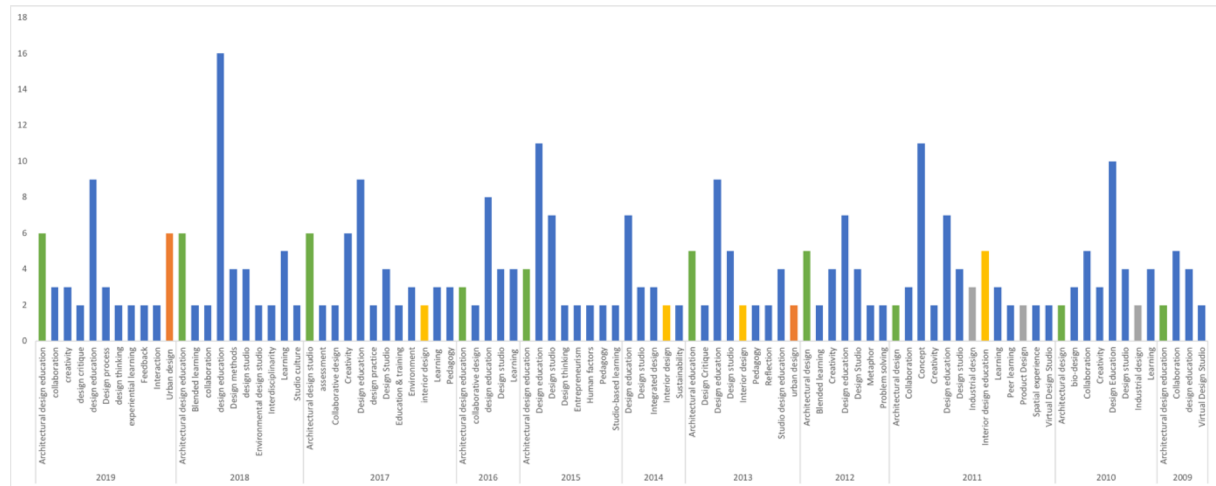


Figure 5. Keyword frequency for different professional education according to years.

Figure 5. tells us more about how design education research comes forward as part of different professional backgrounds. Architecture produces research about design education consistently through the decade with an increase towards the end of the decade. Urban design becomes more popular in the design education articles towards the end of the decade, but it does not remain consistent throughout the decade. Interior design has a quite consistent contribution to design education research but there is a slight decrease in the trends towards the end of the decade. Industrial design and product design has only been popular in 2011, other contributions of the

Figure 6. shows popular concepts according to years. The keyword “concept” reaches the peak in 2011 and it remains the only year that this term is mentioned. There are more consistent terms that stay popular throughout the decade: these are “collaboration/collaborative design” and “creativity”. This fact describes the importance of collaboration in design education in the last years, as well as creativity remains as a popular concept in design education. We also can follow the emergence of some learning concepts like blended learning experiential learning, peer learning, studio-based learning. The most recent one of these learning concepts is blended learning.

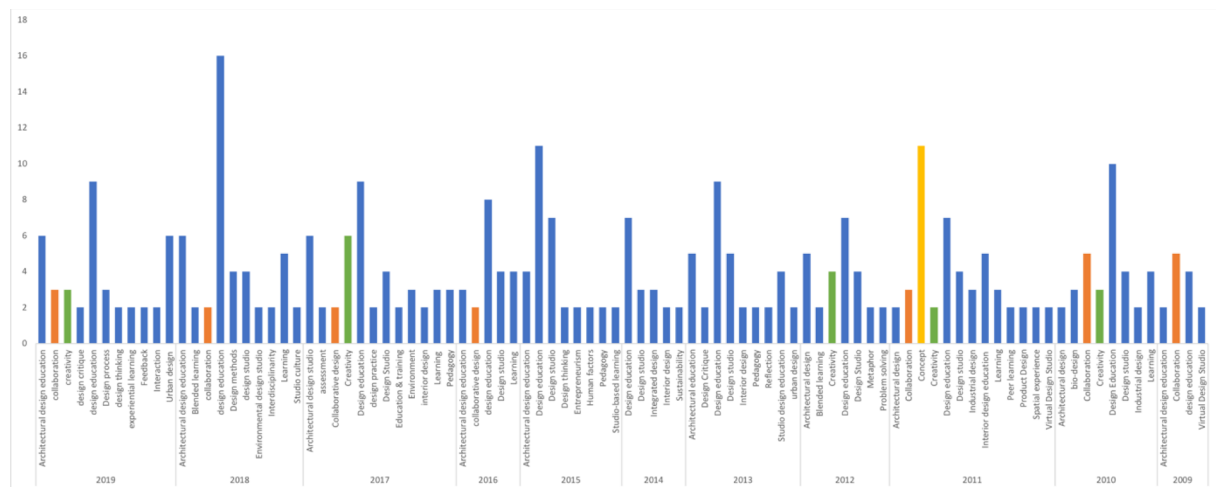


Figure 6. Some popular keyword frequency according to years.



We try to reveal the hierarchy and fictional structure of the relationships between words and concepts by network analysis. We aim to establish connections between the most repetitive words by linking them in terms of meaning by network analysis.

collaboration, interaction and participatory design concepts. The other mainstream in the connection of the network interaction between design, sustainability and environmental sustainability. All these relations and interactions are demonstrated in the Figure 7.

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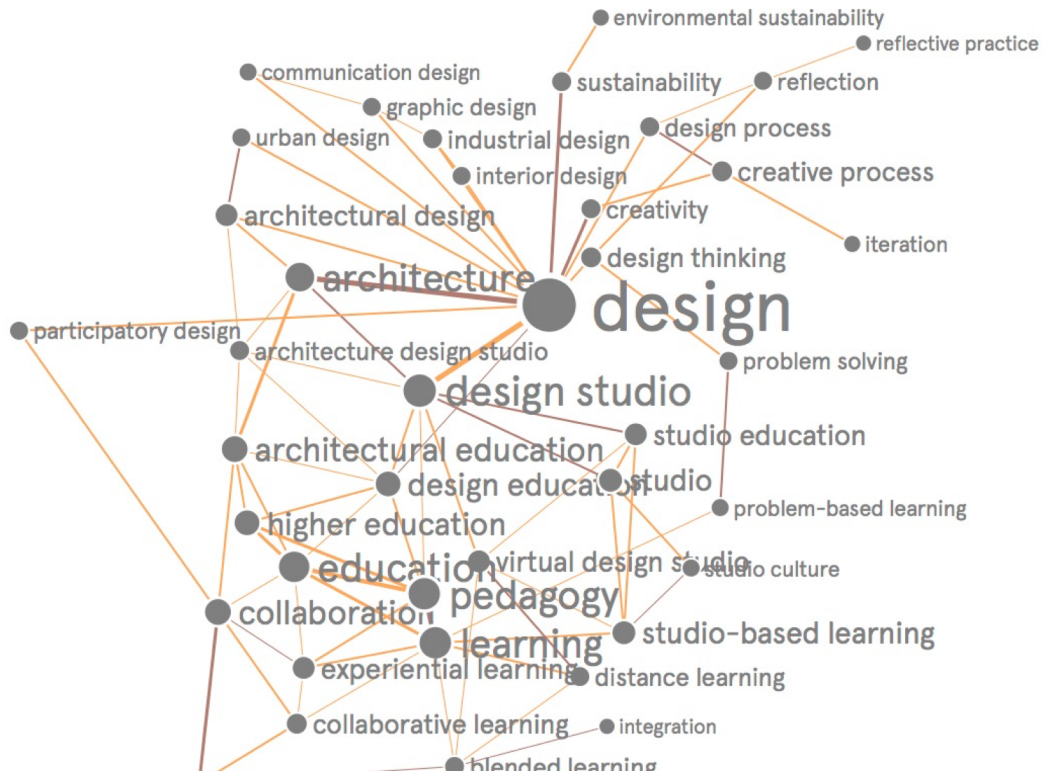


Figure 7. Network Analysis of the most repeated words and concepts.

In the network analysis the main interaction between design and the main disciplines like architecture, architectural design, interior design, industrial design, graphic design, communication design and urban design. Creativity concept in design studio appears in the network analysis as interactions between creativity, design thinking, design process, creative processes, reflection and reflective practices. Interaction between design education and pedagogy extended in the network with the concepts of learning, experiential learning, distance learning, collaborative learning and blended learning. Collaborative learning and experiential learning are in relation with

### Conclusion:

All the design education approaches over the last century lead to a continuous will for the research of design education. However, the design education articles written in the last decade show us that the major keywords and concepts are evolving and changing. The most used keywords and concepts, apart from design education and design studio which were the search keywords of this dataset, notably creativity, collaboration, learning/pedagogy concepts show that there is a constant inclination towards new ways of learning such as blended learning, peer learning, studio-based learning, collaborative learning and experiential learning, and the search for creativity in design education as many related concepts such as

design thinking, design process, creative processes, reflection appear in the articles.

The evaluation of the terms and concepts according to years put forward that there are consistent terms that stay popular like “collaboration/collaborative design” and “creativity”. There are also terms that become more popular towards the end of the decade such as urban design and architectural design education, meaning that more research has been done in those disciplines. There are also a few concepts that have been more popular in the beginning of the decade but started to become less popular towards the end of the decade like virtual design studio.

The research findings of this article show that design education had trends on being more locally identical, more systematic, interdisciplinary, integrated and process oriented. Studio education remains as one of the most crucial ways of teaching design, and the last decade allows many different integrated ways of learning, including interactive, collaborative and experiential methods.

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