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Bibliometric Analysis of Basic Design Education

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Abstract
This study thoroughly examines the role of basic design education in architecture, urban planning, and landscape architecture, tracing its evolution through the influence of Bauhaus literature. A comprehensive bibliometric analysis of 2,171 Web of Science publications (between 1970 and 2024) uncovers key contributors such as David Fonseca, Badiossadat Hassanpour, Ashraf M. Salama, Nangkula Utaberta, and Salih Ceylan. Research articles are the dominant form of publication (n=1094), with architecture leading the way (n=959), closely followed by education and engineering. Türkiye emerges as the leader in publication output (n=413). The term "Architectural education" is the most frequently used keyword, while recent terms (post-2020) such as "creative thinking," "virtual reality," "AI," "augmented reality," and "project-based learning" signal the emergence of new trends in the field. These shifts underscore a growing integration of technology, innovation, and interdisciplinary methods in design education, sparking excitement about the potential of these developments. The study's findings underscore the need to update curricula to mirror contemporary practices, ensuring that future designers have the relevant skills, digital competencies, and critical thinking abilities for a rapidly evolving professional landscape.
Keywords: Architectural education, Basic design, basic design course, basic design education, basic design studio, bibliometric analysis, landscape architecture education, urban planning education

Introduction

As the first step of art and design education, "basic design" is an important starting point (Çetinkaya, 2015: 33). The educational process includes basic principles and concepts to develop visual and spatial perception. Basic design education, a comprehensive educational model that aims to strengthen creativity, thinking processes, and visual perception, finds application in many fields, such as art, design, and architecture. Although Bauhaus has been in a central position since 1919 in the basic design education of classical design and architecture schools, movements such as "Vhutemas," "Chicago Bauhaus," and "Ulm School" as well as Constructivism, De Stijl, Gestalt psychology, Swiss Style and Modernism have played a role in its shaping over time (Besgen et al., 2015: 429). These different influences have led to the transformation of modern design education into an interdisciplinary and global understanding. Although basic design education faded away in the 1960s, it was observed that its importance increased again later (Besgen et al., 2015: 428). Remarkably, recent technological developments and innovations and the use of artificial intelligence are changing approaches in basic design education and necessitating the integration of different practices and ways of thinking (Tang et al., 2022: 4).

Basic design education allows students to make effective designs in different disciplines by providing them with creativity, abstract thinking, and problem-solving skills (Davenport, 2009: 68). At the same time, it encourages a holistic, creative, and experimental methodology by developing students' learning styles and cognitive abilities concerning the basic principles of design (Boucharenc, 2006: 1). This training combines theory with the practice of "learning by doing" by focusing on intellectual activities such as observation, perception, impression, experience, research, memory, evaluation, and creativity (Uysal &

Topaloğlu, 2017: 22; Yurttaş & Terece, 2020: 103,114). This practice focuses on teaching the basic principles of design, such as shape, color, order, texture, light, and rhythm, based on Gestalt psychology and the Bauhaus school, to produce two- and three-dimensional compositions (Boucharenc, 2006: 1; Yavuz & Yildirim, 2012: 307,308). However, basic design education needs a broader restructuring to meet today's technologies and new developments (Uysal & Topaloğlu, 2017: 21-23). Nowadays, digital tools such as 3D modeling, simulations, and a wide variety of software and algorithms are used in design processes instead of or in addition to traditional hand drawings and material use. These tools support designers in the design creation process, save time, offer different options, and open new paths. New concepts, like new technologies, also affect educational processes. For example, integrating "sustainable design" and sustainability principles into the design curriculum and using recyclable materials in studies allows students to learn about reducing environmental impacts.

From this perspective, it is essential to evaluate the basic design concept and the basic design education process since Bauhaus and to examine the scientific studies carried out to keep this education up to date. In particular, identifying new concepts associated with the basic concept of design and incorporating them into the educational process will be beneficial in ensuring that students graduate with the necessary equipment to meet the age requirements. For this purpose, the study used bibliographic analysis to examine the place of basic design education in the literature, periodically examine previous studies, and understand both past and current trends. Bibliometric analysis is a method for examining the production and dissemination of knowledge by establishing relationships between scientific publications (Donthu et al., 2021: 285-287). This method allows the examination of academic influences and trends in a particular subject, author, journal, keyword, or field. Topics such as citation relationships between publications, author collaborations, and keyword analyses are generally addressed in bibliometrics analysis.

This study aimed to create a map of articles, books, and other academic studies published on basic design education in the Web of Science (WOS) database using this analysis method. In this way, the study helps to understand what research has been done in the field so far, which topics have received more attention, and where the knowledge gaps are. It also enables us to see the development and trends of basic design education over time and to understand which years saw the most publications in this field, which topics came to the fore in specific periods, and how they changed.

In this way, research findings will create new areas of study for researchers and opportunities for educators to develop more effective teaching strategies. In addition, this analysis will make visible the leading names, concepts, and collaborations in the field, thus enabling the evaluation of design education in a broader context and seeing the development and trends of basic design education over time. This method was used to understand in which years the most publications were made in this field, which topics were prominent in specific periods, and how they changed. For example, trends such as the increasing integration of digital tools into design education in recent years can be identified. Determining the most cited studies on basic design education, the most published academics and essential publications, and identifying important reference sources for researchers inspires new research.

The results obtained will provide information to educators on how to improve basic design education, show which approaches and methodologies are more successful and which learning strategies are effective, and guide the renewal and development of educational curricula. Determining the areas where basic design education research is concentrated, and the neglected areas will create opportunities for new research and may direct the attention of researchers to areas that have not yet been discovered or studied less.

Method

To monitor and examine the developments in the field of "basic design education" focused on architecture, planning, and landscape architecture, the literature-based scanning results were analyzed with the "bibliometric analysis" technique. The Vosviewer software, which provides convenience to researchers, was used to discover the changes in the literature on the concept, the subject under study, and the related new concepts. This program offers different visualization techniques and allows for multidimensional and in-depth data analysis (Dirik et al., 2023: 168,173).

Bibliometric analysis is a method of examining and analyzing large amounts of scientific data, such as journal articles, books, and conference proceedings, to organize existing information about a particular field or research topic and illuminate newly emerging points (Donthu et al., 2021: 292, 293; Yu & He, 2020: 2). This method, which has been increasingly used in scientific research in recent years, is quantitative in evaluating literature in many disciplines (Donthu et al., 2021: 286-287; Osareh, 1996: 149). Databases such as WOS and Scopus facilitate the acquisition of large volumes of data, and software such as Gephi, Leximancer, and VOSviewer enable the analysis of this extensive data, which has increased academic interest (Donthu et al., 2021: 285).

Bibliometrics was introduced in the early 1900s by psychologists who collected statistics related to their disciplines to contribute to the advancement of psychology (Godin, 2006: 109, 111). It began with systematic data collection by Alfred Lotka and Samuel Bradford and evolved into the modern era with citation analysis and systematic processing by Eugene Garfield (Thompson & Walker, 2015: 551-552). Although Pritchard first used the term in 1969, its origins date back much further (Donthu et al., 2021: 286; Pritchard, 1969: 348-349).

"Bibliometric analysis provides quantitative findings on country, author, university and journal productivity, weak and strong research areas, literature gaps, collaboration networks, potential opportunities and widespread impacts of outputs produced in a field" (Dirik et al., 2023: 168). Bibliometric methods include citation analysis, co-citation analysis, bibliographical coupling, co-author analysis and co-word analysis (Zupic & Čater, 2015: 431-432).

In this context, bibliometric analysis was conducted based on the research protocol in Figure 1. Data were extracted from the Web of Science database as of November 04, 2024. The following keyword combination was used to identify all target publications: first, "basic design education" or "basic design studio" or "basic design course". These keywords were included in the search because it was desired to associate basic design education more with **architecture, planning, and landscape architecture**. To achieve this goal, the following query was executed: *ALL FIELDS "basic design education" or "basic design course" or "basic design studio" and "architectural education" or "architecture education" or "landscape architecture education" or "urban planning education"*. This query produced 2171 publications, none excluded from the study.

Online Journal of Art and Design
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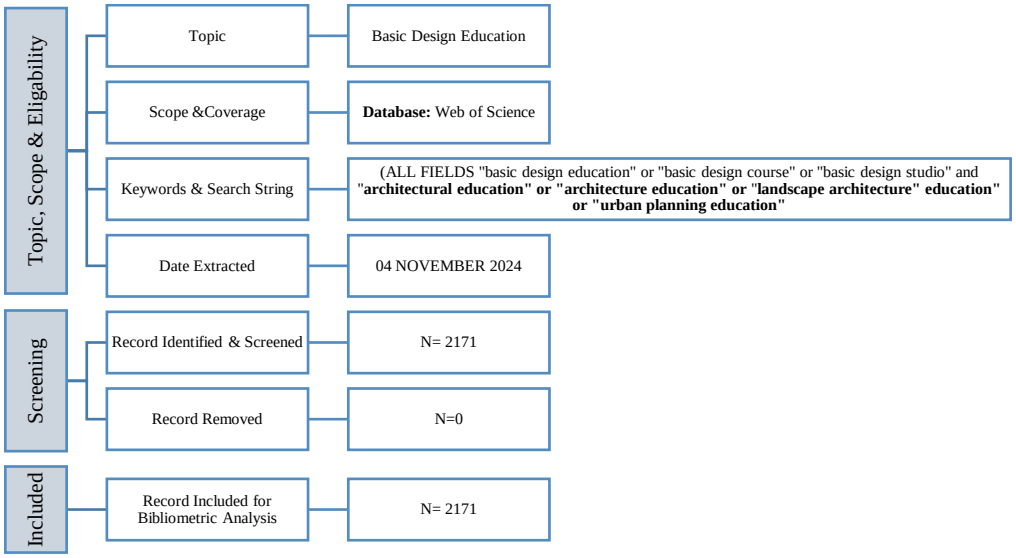

Figure 1. *Research protocol*

The scanning results, which were conducted to monitor and examine the developments in the subject of "basic design education" focusing on architecture, planning, and landscape architecture, were analyzed with the "bibliometric analysis" technique. The Vosviewer software, which provides convenience to researchers, was used to see the change in the concept and the subject in the literature and to discover new concepts related to the subject. This software offers different visualization techniques and allows for multidimensional and in-depth data analysis (Dirik et al., 2023: 173).

Results and Analysis of Findings

In this context, when the keyword "basic design education" was searched singularly to obtain a list of published studies in the Web of Science (WOS) database, 45 studies were reached. In this context, when the keyword "basic design education" was searched singularly to obtain a list of published studies in the Web of Science (WOS) database, 45 studies were reached. Since it was thought that the authors of the research could use the concepts differently, the search was redone by including the keywords "basic design course" and "basic design studio" in addition to the term "basic design education." Only 89 studies were found in the new search: 40 were research articles, 49 were proceedings between 1998 and 2024, and most (n=65) belonged to Turkish researchers. To associate the subject with the fields of architecture, landscape, and planning and to obtain more studies with titles containing related words, the terms "architectural education and architecture education," "urban planning education," and "landscape architecture education" were used to expand the scope of the search in the WOS database. This way, 2171 studies were reached by examining the publications up to 04.11.2024. The study examined the concept by analyzing different aspects such as author, country, keyword, and document type.

Document types and publication years

Document types refer to documents that can be classified into several categories, such as articles, proceedings papers, editorials, notes, reviews, book chapters, book reviews, and books. Figure 2 summarizes the distribution of published documents on basic design, which fall into 18 different document types. The total number of studies obtained was dominated by research articles (n=1094) and proceeding papers (n=884). Nearly half of all publications are categorized as research articles (50.42%), followed by proceeding papers (40.74%). Specific publication formats (a news item, correction, art exhibit review, retracted publication, meeting abstract, book, discussion, database review, biographical item) constitute less than 1% of the overall documents.

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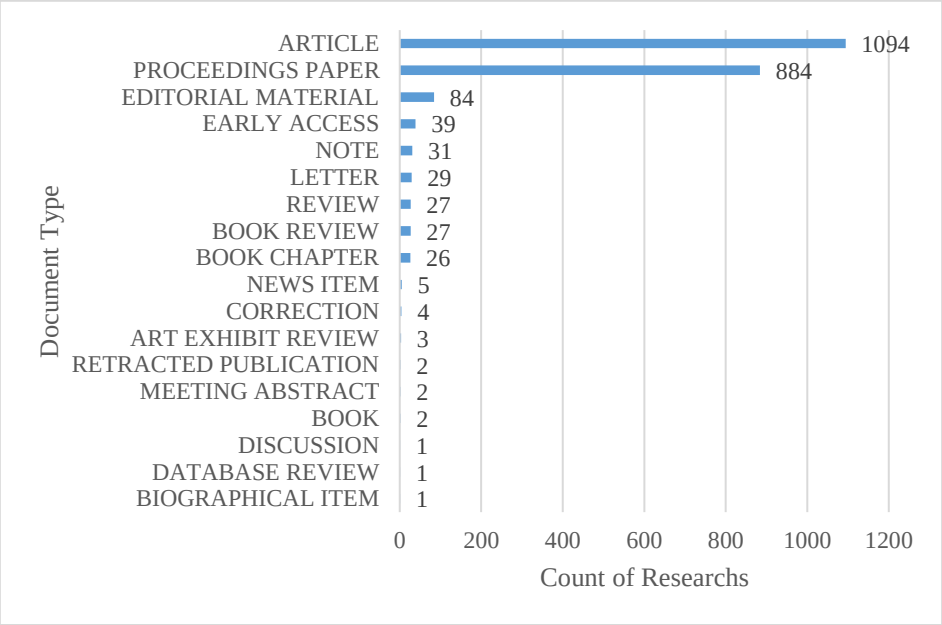

Figure 2. *Distribution of 2171 studies by document type*

The study's document review and bibliometric analysis determined that research on this subject began in the 1970s. "Architectural Education and Social Commitment of Contemporary British Architecture," published by Lipman (1970) in Sociological Review journal, focuses more on architectural education. Until the 1980s, we came across studies that emphasized the title of architectural education.

The keyword "Basic design education" was first used verbatim in a 1998 study. This study is titled "Color research in architectural education - A cross-cultural explorative study" published in the journal Color Research and Application by Janssens and Mikellides (1998).It emphasizes the relationship between color theory and basic design education and that it should be given more space in the education process. One comprehensive and remarkable study is the 2006 study "Research on basic design education: An international survey" (Boucharenc, 2006: 2-16). Studies such as these show how important basic design pedagogy is for contemporary design education and that more research is needed. In Turkey, the first publication directly related to basic design education was the study titled "Problematization of assessment in the architectural design education: First year as a case study" published by Şeniz Çıkış and Ela Çil in 2009. (Çıkış & Çil, 2009). The study argues for the necessity of including students' experiences and learning processes in the design production process by fundamentally investigating the evaluations of studio instructors. The topics that the listed publications focus on in the context of basic design education include learning and teaching strategies, basic design elements such as lines, basic design principles, basic design course contents and education processes in different disciplines, and the inclusion of influential theories such as Gestalt and Bauhaus in the process. Most of the publications listed (n=952) are in the field of architecture.

Publication by country

One of the most striking findings in the analysis is that Turkey ranks first with 413 studies in total. This is followed by the USA (n=324), England (n=122), Spain (n=117), China (n=103), Australia (n=86), Egypt (n=83), Malaysia (n=46), Germany (n=45), Poland (n=43), Iran (n=42), Canada (n=38), Saudi Arabia (n=33), Netherlands (n=33), Chile (n=33), Brazil (n=31), Belgium (n=29), Taiwan (n=28), Nigeria (n=28), Scotland (n=26), Italy (n=26), Serbia (n=25), Portugal (n=24), Greece (n=24), Japan (n=23), respectively (Figure 3). This analysis provides information about the collaborations of countries also. As seen in Figure 4, the most important cooperation among 89 countries is between Turkey

Online Journal of Art and Design
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and the USA. In addition, the USA cooperates the most with Turkey, China, Spain, England, Egypt, and Saudi Arabia.

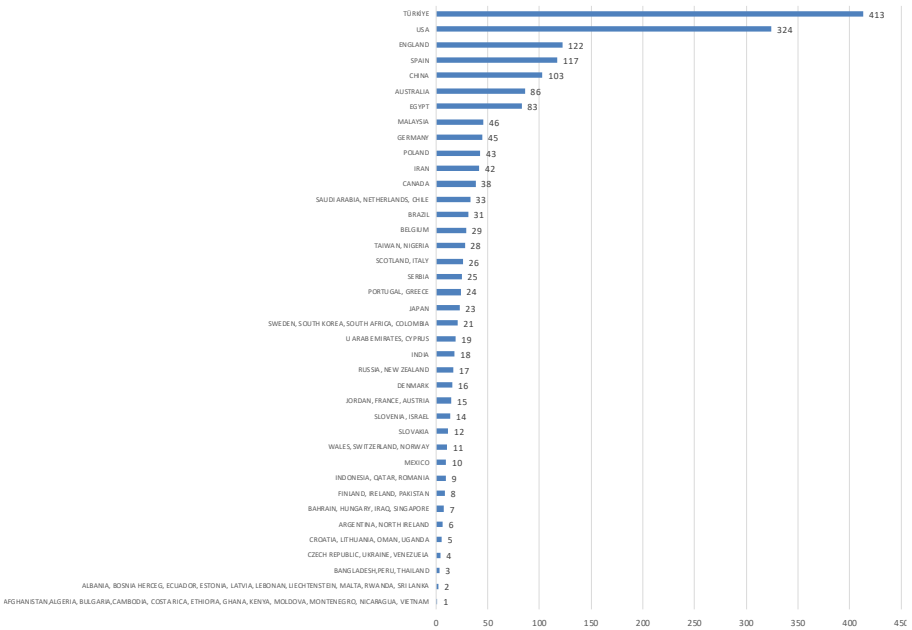

Figure 3. *Publication numbers for 89 countries*

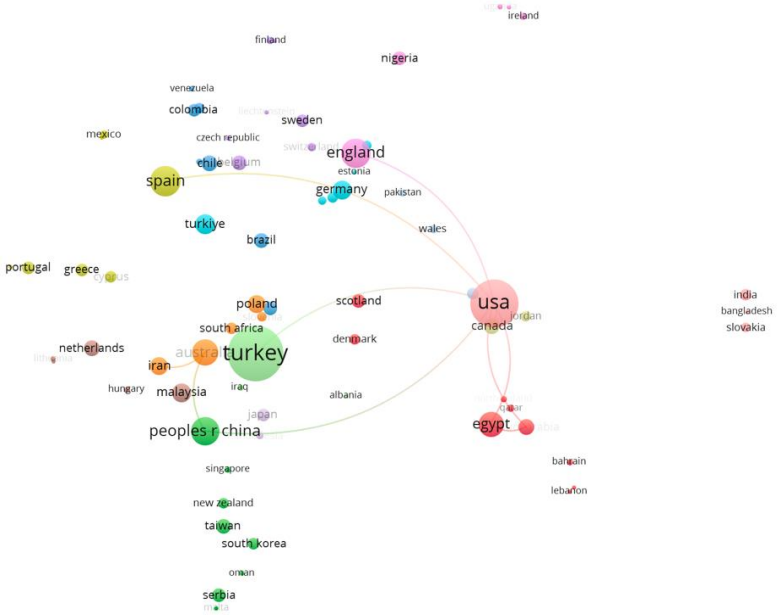

Figure 4. *Collaboration between countries*

Keywords

A map of publications' most frequently used keywords was created using co-occurrence analysis (Figure 5). Since it is preferred that the authors find keywords used at least 5 times when selecting keywords, 175 were determined from a total of 4411 keywords used. In this scan conducted on the axis of basic design education, the word most used is 550 times, and the most connected with 669 is "architectural education." Other keywords with high frequency are "architecture" (203), "architecture education" (142), "education" (128), and "design studio" (100) and show that the subject is addressed in the context of education and architecture in a broad scope. When the words are grouped, 15 clusters emerge where the subjects are combined, as seen in Table 1.

Online Journal of Art and Design
volume 13, issue 3, July 2025
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When the relationships between keywords related to basic design education and the connections between the subjects are visualized, the terms "architectural education" and "architecture education" are at the center, indicating that these areas are the main focus of the research. Among the terms around it, concepts such as "sustainability," "virtual reality," "artificial intelligence," "COVID-19", "design studio," "creative thinking," and "blended learning" stand out for modern basic design education practices. Especially in recent years, new educational trends such as virtual reality, sustainability, and hybrid learning have been integrated into this process. In this context, the colors in Figure 5 indicate that each keyword belongs to older or newer concepts. When interpreting this connection map, it can be concluded that interdisciplinary approaches, digitalization, and sustainability-oriented methods are essential in basic design education nowadays.

Table 1. *15 clusters of 175 keywords*

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	Cluster 9	Cluster 10	Cluster 11	Cluster 12	Cluster 13	Cluster 14	Cluster 15
abstraction	accreditation	accessibility	architectural curriculum	architecture studio	active learning	architectural design education	3d printing	computational design	aesthetics	assesment	curriculum	edification	design studio	building construction
architecture	architectural design	architectural design studio	architectural profession	blended learning	artificial intelligence	architectural history	augmented reality	design-build	architects	cad	european higher education	innovation in the university	knowledge integration	
basic design	architectural practice	architectural education	architecture design	covid-19	computer architecture	architecture curriculum	children	design/build	built environment	coginition	learning outcomes	new technologies	transdisciplinarity	
basic design education	architectural theory	architectural pedogogy	architecture education	covid-19 pandemic	architecture education	computer-aided design	cultural heritage	digital design	climatechange	e-learning	undergraduate			
bauhaus	architecture students	city	bim	development	construction	constructivism	design pedagogy	digital fabrication	energy	educational technology				
composition	art	context	building information modeling	higher education	digital	digital technology	digital architecture	form-finding	environment	learning				
computer aided design	basic design course	design principles	collaboration	ict	engagement	drawing	landscape architecture	generative design	innovation	students				
creative thinking	basic design studio	design process	collaborative design	learning styles	experiential learning	geometry	landscape architecture education	parametric design	pedagogy	teaching				
culture	communication	design thinking	collaborative learning	online education	fabrication	iran	sustainable development goals	participatory design						
design	creativity	digital tools	design studio pedagogy	online learning	history	problem-based learning	turkey	technology						
education	critical thinking	gamification	design studios	professional education	history of architecture	renewable energy	virtual reality (vr)							
interior architecture	design education	housing	engineering education	project-based learning	simulation	representation								
interior architecture education	design tools	inclusion	integration	studio pedagogy	virtual reality	sustainable architecture								
latin america	evaluation	interaction	methodology	sustainable education	visualisation	sustainable development								
learning by doing	habitus	mies van der rohe	sustainability	urban design	visualization									
practice	interior design	place	sustainable design	urbanism										
research	motivation	universal design	urban planning	virtual design studio										
space	nigeria	virtual environments												
studio	perception													
teaching model	studio culture													
theory	workshop													
traditional architecture														
workshops														

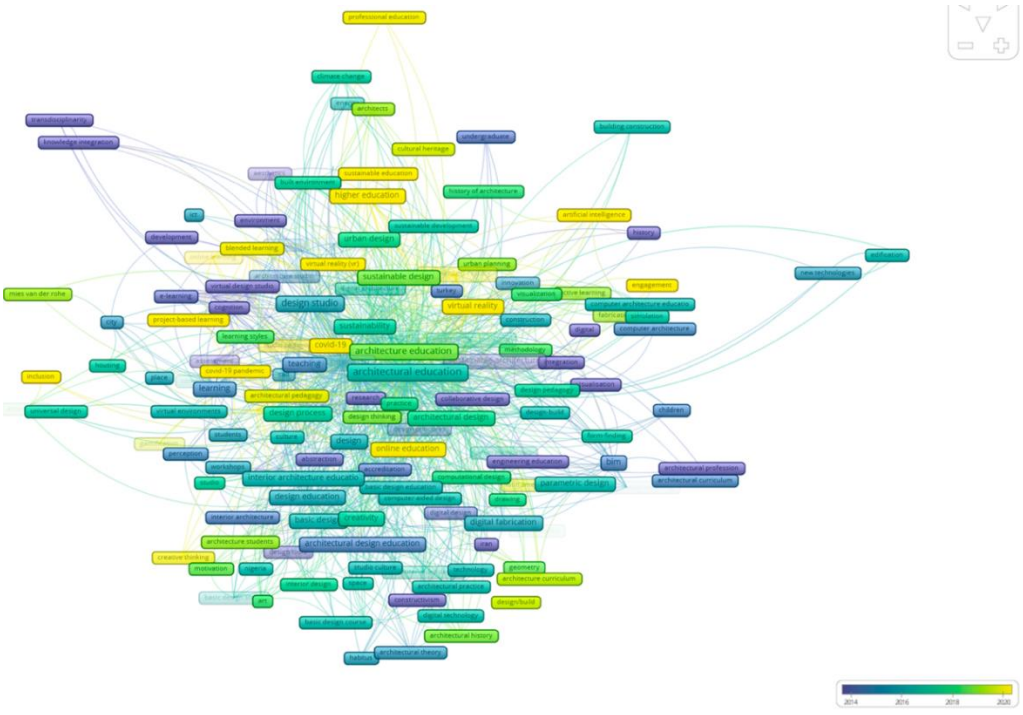

Figure 5. *Bibliometric Analysis of Most Used Keywords in Publications*

Online Journal of Art and Design
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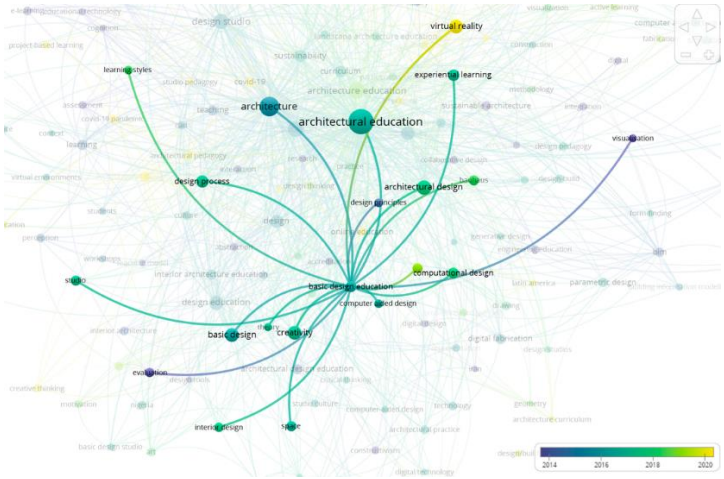

Figure 6. *Concepts that are primarily associated with the concept of "basic design education" (year-based)*

When the primary connections of the concept of "basic design education" in the analysis are examined, it can be said that it has a strong relationship with various essential concepts (Figure 6). It has a strong connection directly with architectural education, as it relates to the concept of "architectural education," which has the highest frequency. This connection shows that basic design is an essential educational step for architecture students and is considered one of the building blocks of this field.

In this analysis, it is also possible to make some year-based inferences about basic design education. Between 2014 and 2020, a transition from traditional methods to digitalization, sustainability, and innovative technologies is observed. While it was more focused on basic education and creative thinking in 2014-2016, between 2017-2020, education methods transformed by digitalization, sustainability, and the pandemic came to the fore. These trends show that architectural education is evolving into a more technology-focused, sustainable, and flexible structure.

Research areas

Although the analysis was conducted by associating the concept with the fields of architecture, landscape, and planning, when the distribution of publications according to research fields is examined, it is possible to see that the research concept is associated with many different disciplines. Although architecture is at the forefront, publications belonging to 65 research areas were found. The number of publications belonging to the first 15 research areas is shown in Figure 7.

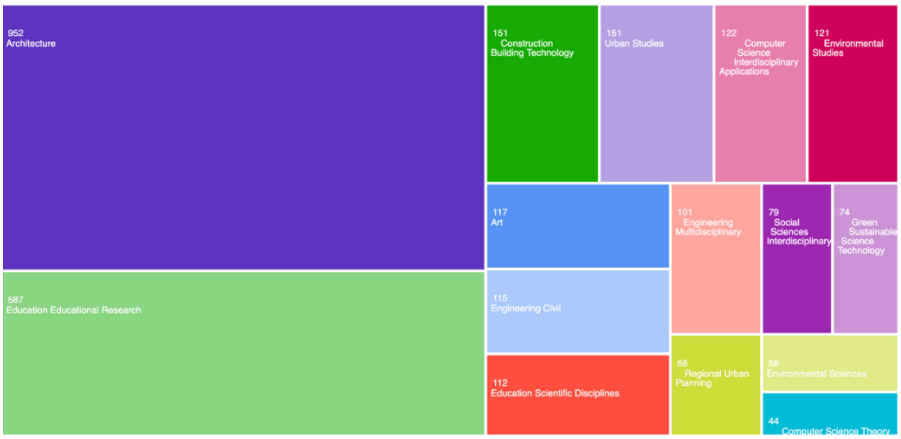

Figure 7. *Distribution of publications according to the top 15 research areas.*

Online Journal of Art and Design
volume 13, issue 3, July 2025
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Authors

In the co-authors analysis, which offers an author-based examination, the number of authors is 3590. In the analysis conducted with the criteria of having published at least two documents and receiving 1 citation, 426 authors were selected and identified with connections between them. According to the analysis, 228 clusters, 314 connections, and a total connection power of 633 were obtained. The authors with the highest bibliographic matches were David Fonseca with 188 citations, Ashaf M. Salama with 165 citations, and Mohammad Taleghani with 150 citations. The five most productive authors are David Fonseca, Badiossadat Hassanpour, Ashraf M. Salama, Nangkula Utaberta, and Salih Ceylan, respectively. The analysis shows that many Turkish researchers have published on the subject.

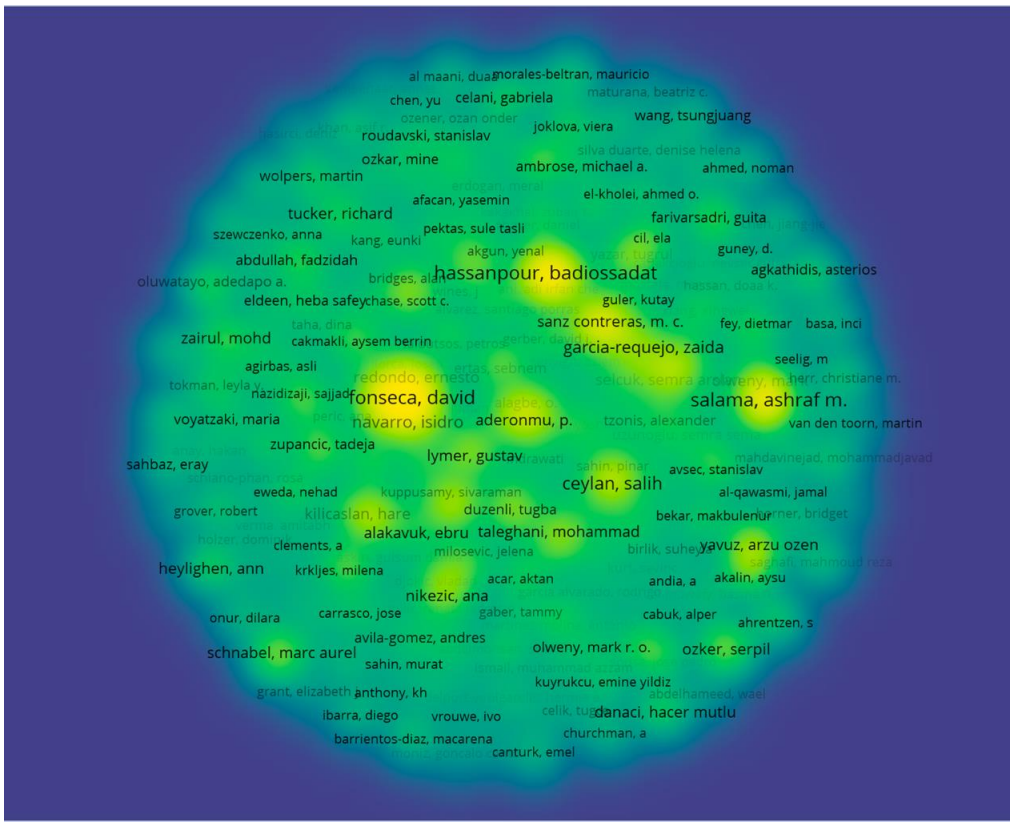

Figure 8. Analysis of authors

Discussion, Conclusion and Recommendations

This study aims to examine the current status of publications on basic design education, their related topics, the current research areas of basic design education, and the research trends. For this purpose, it is based on the bibliometric approach, which provides a structural map of the data collected from the Web of Science database through quantities such as the number of publications by year, document types, source type, number of publications by country, and subject area. The findings presented here cover only the data obtained from the Web of Science database. The data were compiled from searches conducted using the keywords "basic design education," "basic design course," "basic design studio," and "architecture, landscape architecture, and urban planning education" by selecting 'all fields.' For more or different research, the field can be expanded by trying different search techniques in different databases. In the study, when only the concept of "basic design education" was searched for the studies listed on "basic design education" in the Web of Science database, very few publications (n=45) could be reached. An attempt was made to reach a more comprehensive list of studies by using auxiliary words. When evaluated in this context, few sources in the literature on a subject generally indicate that the field is new, original, or needs to be studied sufficiently. Since this situation indicates

a significant knowledge gap for researchers, this study shows that basic design education is a subject that offers an opportunity to contribute to the literature.

The starting point of architecture, landscape architecture, and urban planning education, "basic design education," is a critical education process that teaches design students the basic principles of design and aims to gain creative thinking, abstraction, representation, and design development skills. This education enables students to learn the basic principles that will enable them to understand and solve design problems. Based on Gestalt psychology and the Bauhaus school, this process needs to be renewed and changed with today's dynamics. According to the results of the bibliometric analysis, current topics that intersect with basic design education are "creative thinking, virtual reality, artificial intelligence, augmented reality, project-based learning, online education, sustainable education, blended learning, digital tools, COVID-19". Since these indicate trends, they can guide new research; these concepts can be included in the design education process.

As a result, we can say that "basic design education" has emerged as a research topic for researchers in different countries worldwide from 1970 to 2024. It is also possible to access different types of publications on this subject. While the highest number of studies on this subject is in the field of architecture (n: 959), the field of education follows with 627 publications and engineering with 286 publications. Most of the publications on this subject are in the CPCI, A&HCI, and ESCI indexes. Despite these data, the importance of basic design education, which has been studied less internationally and, in our country, has been revealed. This study will likely contribute to the research to be conducted and to direct the education processes of basic design instructors.

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