

## Graphic Design and Strategy: A Biometric Analysis on Data for The Period 2000-2024

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### Abstract:

Graphic design has become a multidisciplinary field that goes beyond aesthetic concerns where art and technology are blended. For this reason, studies on graphic design and strategies in the Web of Science database were examined using bibliometric analysis. In the research, data such as types and numbers of publications, publication language, distribution of publications by years, authors' profile networks and number of connections, results of author collaborations, co-authorship analysis, keyword analysis, country analysis of publications and citation power were collected. The collected data were visualised in tables. In the research, it was observed that there has been an increase in the number of graphic design publications since 2010. Studies were more preferred especially in the fields of art, design and communication. It was also revealed that there are interdisciplinary connections in the studies. The study will be a valuable reference point for future research in the light of developments in the field of graphic design. In addition, the study will guide researchers who want to turn to new topics in the field of visual communication and graphic design. The field of graphic design can meet the needs of different disciplines. For this reason, the study will also shed light on interdisciplinary researchers. The results obtained will guide designers who need a design strategy, researchers who conduct interdisciplinary studies and visual artists. The results of the research will guide graphic design and interdisciplinary studies from a holistic perspective. It is also predicted that the data obtained will shed light on new research topics and make significant contributions to the literature.

## 1. Introduction

Individuals are exposed to many messages in their daily lives. The more creative and aesthetic of these messages are remembered, while others are forgotten. The retention of messages depends on successful graphic design products [1]. Graphic design strengthens the communication process. It visualises information and enables messages to be conveyed more effectively. Mazlum [2] graphic design is concerned with conveying messages, providing information and promotion. Graphic design is actually defined as 'the art of visual communication'. Graphic design is one of the components of visual communication. In fact, it is a critical intersection point that brings together artistic and functional elements. The fact that graphic design aims to convey and convey certain messages meets

the needs of many interdisciplinary fields. Design elements (line, shape, colour, texture, space) and principles (balance, emphasis, rhythm, harmony, contrast) used in every design field constitute the basis of graphic design [3]. Design elements and principles are at a strategic point to attract the attention of the recipient in the message to be given [4]. These elements affect the design strategy and communication objectives. For this reason, graphic design stands out as an important research subject in both artistic and scientific dimensions [3].

With the development of technology, the impact of graphic design and strategies has started to increase. This situation has also been reflected in academic studies in the field of graphic design and strategies in recent years. The increase in the number of academic studies makes it difficult to stay up-to-date in this field. For this reason, studies in the field of

graphic design and strategies were scanned in the Web of Science database between 2000 and 2024. It was aimed to examine the publications reached as a result of the search with bibliometric analysis. Bibliometric analysis is performed on academic publications in databases related to a particular field. It is a type of research aimed at understanding certain trends in publications through analysis [5]. Bibliometric analysis has been used in many fields from anthropology to tourism, marketing to consumption, health to accounting, digital diplomacy to culture. It has also started to attract attention in the field of social sciences. Sajovic et al. [6] conducted a research on the bibliometric study of a journal in the field of visualisation and computer graphics.

Sajovic and Podgornik [7] examined the data sets obtained from SCOPUS on visualisation fields in computer graphics (VCG) between 1986-2019. Vardar et al. [8] used bibliometric analysis method in publications on typography in graphic design education. In the literature review, it was seen that the researches conducted with bibliometric analysis method in the field of graphic design are limited. For this reason, with this study conducted in the field of graphic design, publication trends and research topics in the field were shown. The study will help to better understand the existing knowledge. It is also thought to contribute to future studies.

In this context, answers to the following research questions were sought:

- How are scientific publications distributed according to years?
- How does the publication language of scientific publications show a distribution?
- What is the distribution of the type of scientific publications?
- How is the co-operation between the authors who carry out the most collaborative work?
- What is the distribution of the countries of scientific publications and inter-country collaboration?
- What is the number of citations of scientific publications?

## 2. Graphic Design and Strategies

The word 'graphic' comes from Latin 'graphia', English 'Graphic', and French 'Graphique'. Today, the word graphic is used to express visuals designed in a way that all people can understand in common. For this reason; the word graphic primarily means writing, drawing, displaying and reproducing [9]. The word graphic is briefly used to express the actions completed with original design and design. While graphic design is defined as an art of visual

communication, it refers to the expression of objects visually, with colours and shapes [2]. The word graphic is briefly used to express the actions completed with original design and design.

When the word design is considered as a single word, it includes all kinds of activities that have a structure within a planning. In this context, design should not be understood as making a model, mould or ornament. The phenomenon of design is at the basis of all arts and is realised through the act of designing. The act of designing includes all kinds of activities to be created for the product [10]. When a design is made, design elements, which are the basic elements of design, are utilised. These elements consist of line, shape, texture, space, size, tone and colour [11]. Numerous different designs are created according to the way these elements are used [12]. It may not be sufficient to use only design elements in a design. In this context, the basic principles, elements and strategies of graphic design constitute the key to creating successful designs [13].

The development of computer technology has moved almost all of the graphic design field to the computer environment [14]. This situation has transformed the visuals used in graphic design into digital formats that can be processed in accordance with virtual environments [15]. For this reason, graphic design is needed to realise visual communication in many fields. The field of graphic design continues to expand the framework it addresses every day [16]. As the need for graphic design has increased, the need for graphic designers has also increased. It is necessary to determine a design strategy for quick responses to design demands [17]. The visualisation of the message to be given is provided by visual values and design elements. Design elements are valid in graphic design, which expresses the art of visual communication, as in all art fields [18]. In general, design elements are grouped as point, line, measure, texture, colour, form, shape and direction. Design principles are grouped as ratio-proportion, rhythm, integrity-conformity and contrast. It is seen that design elements and principles are common in almost all visual arrangements [19].

In order for any design to be realised in a field, the designer must first determine a design strategy. Because, as in every field, designs made with a correct planning strategy in the field of design are more successful. Thus, messages can reach the target audience more accurately and quickly. These strategies of designers start with the elements of design and are completed in the light of design principles. Without these elements and principles, it is not possible to talk about a design strategy or even a correct design. Because, as in every field, designs made by developing a correct strategy in the field of

design are more successful and can reach the target audience faster [17]. This situation has started to bring a strategic perspective towards the field of graphic design. Updates in digital programmes and artificial intelligence applications have started to expand the strategic perspective in the field of graphic design [20]. Following current developments, some companies have started to develop new strategies for graphic design. Airbnb has developed a code technology that identifies designs. Thus, designs and drawings were quickly converted into code and saved. The identified drawings were transformed into fast graphic design products for the needs [21]. Another design strategy was created by Netflix. It has developed an artificial intelligence application with automated translation. Thus, applications addressing the field of graphic design are now quickly analysed. Thanks to this feature, the localisation of content in different languages has accelerated considerably [22]. As seen in the examples, strategic approaches in the field of graphic design are developed as the needs for the field are recognised. In this context, designers will be able to focus on more strategic product designs in the future [21].

### 3. Material and Methods

The design of the study in which qualitative research method was used was determined as case. This research design is used in cases where the boundaries between a phenomenon and the content cannot be fully determined. It is especially preferred when there is more than one data source [23]. The case study method consists of basic cognitions such as data collection, analysis, case selection, interpretation of findings and reporting. This method supports an interdisciplinary approach. It also provides researchers with a detailed perspective [24]. The research data consist of publications in the Web of Science (WoS) database between 2000 and 2024. Data were collected from the Web of Science (WoS) database on 25.05.2024 and some filters were applied during the data collection phase. One of the filters applied is keywords and these keywords are written between quotation marks. The other filter is to search with the conjunction 'and'. The Web of Science database was searched by using the conjunction 'and' between the keywords 'graphic design' and 'strategies'. As a result of the search, a total of 517 publications were found. The publications were analysed through the analysis of general information (distribution of studies according to type, language, years and subjects), author profile and network analysis, co-authorship analysis, keyword analysis and country analysis of publications. Bibliometric analysis was used to

analyse the data obtained. Bibliometric analysis is a method that enables a general profile to be revealed by determining the citation links in the scientific literature [25]. Voswiever (version 1.6.20) and R studio Bibliometrix software packages were used for bibliometric analysis. The data set of the research was taken in '.txt' format.

## 4. Results

Bibliometric analysis method was used in the study. In this section, general information about the publications (distribution of studies according to type, language, years and subjects), author profile and network analysis, co-authorship analysis, keyword analysis and country analysis are included. The data obtained are presented as graphs, figures and tables.

### 4.1. General Distribution of Information on Publications

In line with the purpose and scope of the research, 517 publications were analysed and the results were presented in this paper.

*Table 1. Publication types*

Publication Type	Number of Publications
Article	354
Declaration	76
Review article	65
Book chapter	10
Editorial material	5
Early appearance study	4
Book review	3
<b>Total</b>	<b>517</b>

Among the types of publications scanned, 354 articles ranked first. Other publications are 76 papers, 65 review articles, 10 book chapters, 5 editorial materials, 4 early view studies, 3 book reviews (table 1). It is seen that book review studies are less preferred. The publication languages of the studies include English, Spanish, Portuguese, Turkish, Russian, Catalan, Catalan, Chinese, Croatian and Czech (table 2).

*Table 2. Language of publication distribution of the studies*

Language	Number of Studies
English	448
Spanish	35
Portuguese	6
Turkish	3
Russian	2
Catalan	1
Chinese	1
Czech	1

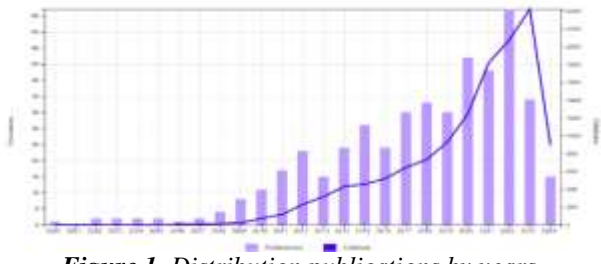


Figure 1. Distribution publications by years

English is the language with the highest number of publications. The other languages are Spanish (35), Portuguese (6), Turkish (3), Russian (2), Catalan, Chinese, Croatian and Czech (1). The distribution of publications by years in figure 1 covers the period between 2000 and 2024. Publications before 2000 were not included in the study. In this direction, the highest publication rate is in 2022. The lowest publication rate is in 2001. There was a continuous increase in the number of publications between 2007 and 2012. After 2012, there are fluctuations in the number of publications. While the number of publications increased in some periods, it decreased in others (figure 2).

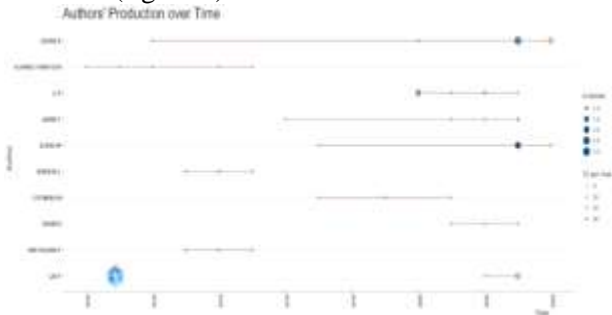


Figure 2. Authors' publication intervals according to years



Figure 3. Distribution publications according to their subjects

When we examine the distribution of publications according to their subjects, the subject of art (8.43%) has the highest rate. Other fields are; 6,62% educational research, 5,22% interdisciplinary applications in computer science and environmental science, 5,02% communication, 5,02% multidiscipline (figure 3). It is seen that graphic

design and strategies are also preferred in different disciplines.

4.2. Author Profile and Network Analysis

Data belonging to 1747 authors were obtained in the study. Visuals of the authors' publication intervals according to years are given below. Graph 2 shows the publication ranges of the authors according to years. The time range of the research was limited to the years 2000 and 2024. In this context, the number of publications of the authors has increased since 2010. After 2016, it is seen that publications were made by more authors. In addition, the academic productivity of the authors over the years and the visualised. There are significant differences between authors in terms of both productivity (number of articles published) and impact (citation). Some authors published regularly, while others showed high productivity in certain years. Zhang Z. started publishing in the field in 2012 and continued until 2024. Especially between 2018 and 2022, he published more articles and received high citations. Alvarez Tamayo DI published between 2010 and 2015. Li X. actively published and cited articles between 2020-2023. Zhang W. published between the years 2014-20203. However, the citation status varies according to years. Brichta L., 2011-2015, Cutunisu M., 2017-2021, David D., 2021-2023, Greengard, 2013-2019, Liu Y., 2022-2023.

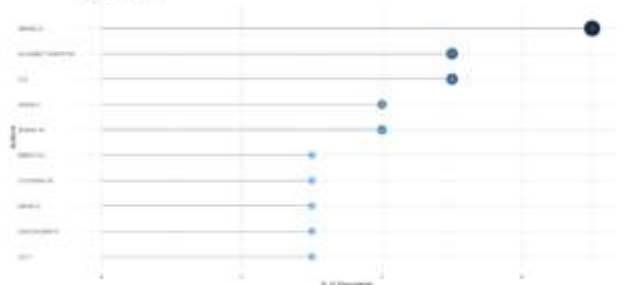


Figure 4. Authors' publication graph

The figure 4 presents the list of 'Most Important Authors' with the most publications. The X-axis shows the number of documents published by the authors and the Y-axis shows the names of the authors. It is also analysed which authors have published more and which authors have contributed more to the literature. In this context, Zhang Z. is the author who contributed the most to this field. Zhen Z. draws attention as the author with the highest number of publications with 7 publications. Almanse Tamayo DI. and Li X. have 5 publications, Wang Y. and Zhang W. have 4 publications and other authors have 3 publications.

4.3. Co-authorship Analysis

In the co-authorship analysis, 1 publication and 1 citation criteria were taken into consideration.



Collaboration between authors was identified. In this field, 1783 authors were able to pass the threshold.

**Table 3. Authors with the most links**

Author	Number of Connections
Zhen Zhang	33
Bo Peng	29
Yong Chen	23
Sinobol Chusilp	23
Alan Daneman	23

34 links were found between 34 names. The table 3 shows the 5 authors with the highest number of links. When we analyse Table 3, the author with the highest number of links is Zhen Zhang with 33 links. Other prominent authors in this field are Bo Peng (29), Yong Chen (23), Sinobol Chusilp (23), Alan Daneman (23). In the ranking of the most cited authors, the first three authors have the same number of citations (table 4). These authors are Peter Damm, J. Christopher Nolan and Marc Prentki with 641 citations. Elaine Dimasi and Kenneth Evans-Lutterodt have 594 citations.

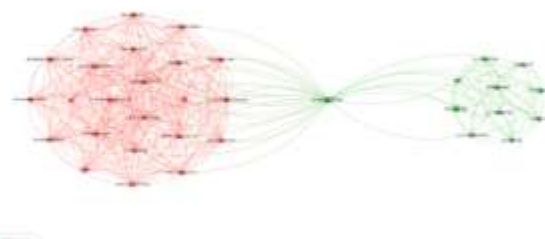
**Table 4. Most cited authors**

Author	Citation Number
Peter Damm	641
J. Christopher Nolan	641
Marc Prentki	641
Elaine Dimasi	594
Kenneth Evans -Lutterodt	594

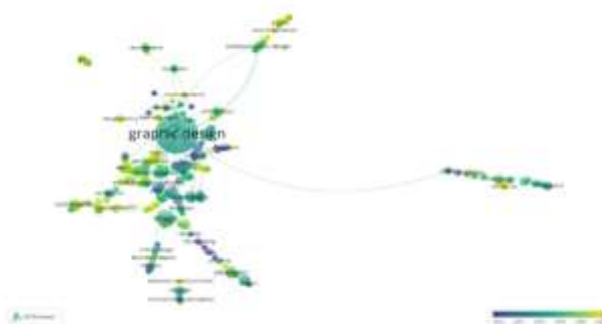
**Table 5. Distribution of authors according to publication, citation and total link strength**

Author	Number of Publications	Number of Quotations	Total Connection Power
Zhen Zhang	2	112	33
Bo Peng	1	89	29
Yong Chen	1	41	23
Sinobol Chusilp	1	41	23

The table 5 shows the publication, citation and total link strength of the authors. Zhen Zhang ranks first in the list with 2 publications, 112 citations and 33 link strength. Bo Peng ranks second in the list and has 1 publication, 89 citations and 29 link strength. Other authors have 1 publication, 41 citations and 23 link strength. Figure 5 shows the links between the authors who co-published with each other. It is seen that Zhang Zhen is the author who has done the most work and stands out as the author with the strongest connection.



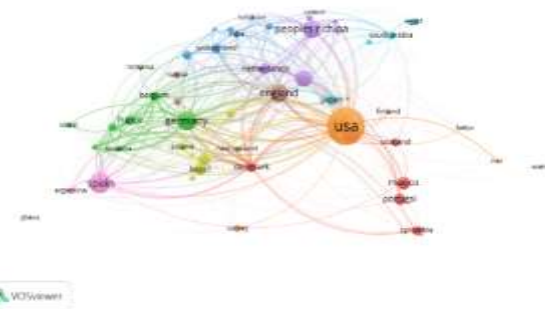
**Figure 5. Co-authorship analysis network map in terms of author**



**Figure 6. Keyword cloud**

#### 4.4. Keyword Analysis

Bibliometrix programme is shown. Graphic design (59), design (11), education (6), strategy (5), visual identity (5) and design education (5) keywords were found to be more preferred. The connection strengths of the words are in parallel with the number of repetitions. It is seen that the connection strengths of the most repeated words are also the highest. Graphic design was the word with the highest link strength with 249 link strengths.



**Figure 7. The most cited countries**

#### 4.5. Distribution Of Studies by Countries

Within the scope of the research. During the country analysis of the publications analysed within the scope of the research, 62 countries with at least 1 publication were identified. Among the countries, the top 5 countries with the highest number of publications were the USA, Spain, Germany, the UK and China, respectively. The countries with the

highest number of links are the USA, Germany, Denmark, the UK and France. The USA ranks first in this field with 165 publications and 7339 citations. The USA is followed by Spain (51), Germany (44), the UK and the People's Republic of China (37). In the citation ranking of countries, USA (7339), Australia (1543), Germany (1509), Canada (1379) and England (1185) are the countries with high citation numbers. When the link strength between countries is analysed, USA (9903), Germany (6473) and UK (5849) stand out as countries with high link strength.

## 5. Conclusions

The database of the research is Web of Science. The research data covers the years 2000-2024. A search was made using the keywords 'graphic design' and 'strategies'. 517 studies were analysed bibliometrically. The data obtained were visualised and interpreted. In the analysis of the general information of the publications, the type, language, years and subjects of the study are mentioned. The most common type of publication is article and the language of the studies is English. When we look at the distribution of publications according to years, the number of publications increased between 2007 and 2012. The number of publications between 2000-2009 is limited and an increase in the number of publications is observed after 2010. In the subject distribution of publications, the subject of art ranks first. Zhen Zhang is the most influential author in author profile and network analysis classification. He ranks first in both the number of publications and the number of links. The most cited authors are Peter Damm, J. Christopher Nolan and Marc Prentki. The number of citations of these authors is 641. According to the keyword cloud result, the word graphic design (59) was mostly preferred in the publications (figure 6). The word graphic design (249) is the word with the highest link strength. According to the result of country analysis of publications, USA is the country with the highest number of publications and citations (figure 7). It ranks first with 165 publications and 7339 citations. As a result, this study reveals the academic research on graphic design and strategies and the trends in this field. Studies in the field of graphic design are concentrated in the fields of art, communication and design. In this context, there is a need for studies investigating the impact of graphic design on these fields. In addition, it is thought that the study will be a guide for researchers looking for new methods in visual communication, different disciplines, design experts and visual designers who need the field of graphic design. The data of this study is limited to the Web of Science database. It may be suggested

that future research should be conducted in different national and international databases. Studies in the field of graphic design and strategy can be analysed in terms of different parameters (demographic and academic information of the authors and in which journals these publications are mostly published, etc.). It may be recommended to use different visualisation programs in literature reviews. Bibliometric Analysis is used for different application in literature [26,27].

## Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
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- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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