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SCIENCE MAPS AND BIBLIOMETRIC ANALYSIS ON HYGIENE EDUCATION DURING 2012-2021

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Abstract. *Hygiene education is becoming increasingly popular and is now addressed in both formal and informal education systems. Examining hygiene education research and developing a vision for the future will lead to creating a roadmap for future research as well as an analysis of past research. Research on hygiene education encompasses a variety of subtopics. It is critical for future researchers and thematic studies in this area to determine if there is a pattern to these concerns that cover a wide range of topics. The purpose of this study is to examine the topic of hygiene education using bibliometric analysis. From the Scope Database, 503 records remain for bibliometric analysis. This results in an average number of 5.02 publications per year. 1973 people contributed to the study. Among the top 10, most influential sources in terms of the number of articles are four websites related to dental hygiene. The United States leads the world in both the number of publications and a total number of citations, followed by Canada and China. Most of the research was related to oral hygiene education.*

Keywords: *bibliometric analysis, hand hygiene, hygiene education, dental hygiene*

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Introduction

Hygiene education has become a popular concept discussed in both formal and informal education systems. Examining research in the field of hygiene education and developing a forward view of this topic will lead to the development of a roadmap for future research as well as an analysis of past research. Before we define the boundaries of hygiene education, we must define the term "hygiene." It is in this context that the World Health Organization's concept of hygiene emerges. Hygiene refers to the conditions and behaviors that help maintain health and prevent the transmission of disease (WHO, 2017). The focus of the definition is on protecting the health and not spreading disease. Health is a social science topic with significant difficulties and potential for the future of humanity, and it is closely related to education (Arnold, 2018). Two main concepts are mentioned: The first concept is conditions and the second is behavior. The fulfillment of conditions can be associated with many variables. When it comes to the concept of "behavior", learning the behavior, reinforcing the right behavior, and eliminating the wrong behavior are associated with "education".

The definition of hygiene education in this context is hygiene education aimed at providing the necessary training to prevent the spread of disease and the acquisition of the necessary behavior, knowledge, and attitude to protect oneself from disease. The details of the definition will be more specific depending on the subject area. For example, in the field of hand hygiene (HH), hygiene education is understood as learning and applying hand hygiene standards and guidelines (Kelcíkova et al., 2012). Oral or dental hygiene education is about learning oral health behaviors that help prevent oral health impairment (Mueller et al., 2022). Hygiene education is a multidisciplinary field of study (V. Curtis et al., 2003) that is closely related to health (Huang et al., 2019), health education (Jatmika & Maulana, 2018), and science education (Eley et al., 2020; Morrish & Neesam, 2021) in education. The material in the hygiene education curriculum is integrated into science education curricula, particularly at the elementary and secondary school levels (Morrish & Neesam, 2021). Even when considered in this context, hygiene education is closely related to science education.

Hygiene education is considered crucial in preventing the spread of various dangerous diseases, especially among adolescents. According to Diouf

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et al. (2014), the majority of diarrheal diseases are preventable through the implementation of water, sanitation, and hygiene initiatives (WASH), all of which aim to stop the fecal-oral transmission routes colloquially referred to as the five "F's" (liquids, fields, flies, fingers, and food). Numerous small-scale measures to improve hygiene and water treatment help reduce diarrheal disease in children (Clasen et al., 2007; Ejemot et al., 2008). Hand hygiene may have prevented diseases such as gastroenteritis, respiratory infections, trachoma, fatal neonatal infections, and worm infections (Biran et al., 2014). Hand hygiene education has been shown to help increase handwashing compliance among health care workers (Kelcíkova et al., 2012). Some studies have demonstrated that individuals' knowledge and performance of hand hygiene habits improved as a result of a handwashing activity or campaign (Biran et al., 2014; Grover et al., 2018).

According to Curtis et al. (2009), large-scale handwashing promotion initiatives are needed that go beyond the basic premise that teaching about germs and diseases would influence behavior. They proposed a strategy to identify how handwashing can be integrated into children's routines, motivations, and planned activities in their home environment. Studies in hygiene education are important for all age groups and countries. Hygiene education is included in the curricula of many countries (Wittberg et al., 2021). There is an urgent need for increased targeted teaching activities on proper hand hygiene (Guinan et al., 2002; Szilágyi et al., 2013). Kenyan students in grades 1-8 received hygiene training. Results suggest that the provision of low-cost, locally accessible materials combined with low-intensity teacher training led to increased latrine cleanliness in + HW schools and improved availability of handwashing materials and behaviors in LC +HW and HW schools throughout the study period (Caruso et al., 2014).

For hand hygiene programs implemented to be successful, the positive contributions of all stakeholders, such as school administrators and teachers, should be incorporated (Guinan et al., 2002). For the school environment, hygiene training is necessary not only for students but also for other staff members. Tan et al. (2013) emphasize the importance of food service workers being aware of hand hygiene (RTE) and knowledgeable about the presence of germs and proper handwashing. To promote better hand hygiene, the government should emphasize the need for food service workers to wear mouth guards and wash their hands thoroughly. Another component of hygiene education is dental health. Oral disease is a serious public health problem that affects an estimated 3.9 billion people worldwide, according to WHO (Eley et al., 2020; Marcenes et al., 2013). It is an obvious fact that oral disease prevention is becoming increasingly important as evidence accumulates that oral health is not only about oral health and quality of life, but can also affect overall health (Mueller et al., 2022).

Numerous studies (Hamilton et al., 2017; Kressin et al., 1999; Scheerman et al., 2016; Tadin et al., 2022) have shown an association between oral hygiene behaviors such as frequency of tooth brushing, interdental cleanliness, dental visits, use of fluoride oral hygiene products, and sugar reduction with personality traits and psychological factors. Dental and oral problems do not only exist in developing countries (Jatmika & Maulana, 2018), but also in developed countries (Eley et al., 2020). Regular and proper tooth brushing is the most effective preventive measure to maintain oral health (Tadin et al., 2022). According to Jatmika and Maulana (2018), oral hygiene instruction improved students' dental hygiene practices, so similar training should be continued in schools. Other points of discussion include the hygiene education curriculum. Numerous nations are forced to make changes due to intense curricula (Nordin & Sundberg, 2016). In this case, there is debate about whether the hygiene education curriculum should stand alone (Birch et al., 2019) or be integrated into the science curriculum (Arnold, 2018; Zeyer, 2012). Hygiene and health education have come to the forefront, especially after the COVID -19 epidemic (Lounis, 2020; Čavojová et al., 2022; Morrish & Neesam, 2021).

Bibliometrics Analysis

Bibliometrics is the process of obtaining quantifiable data from published research papers through statistical analysis, as well as the process of determining how the knowledge contained in a publication is used. A method for methodically quantifying the number of publications within their field was developed by American psychologists in the early twentieth century and served as the basis for subsequent groundbreaking metric research (Agarwal et al., 2016; Thanuskodi, 2010). Authors' keywords are used to analyze clusters formed by pairing documents. Pairing is defined as two articles that are bibliographically linked if at least one cited source or keyword is included in the references and keyword lists of both articles (Kessler, 1963). It was decided to use a network analysis technique based on the co-occurrence of keywords contributed to the research by the authors. The notion of degree centrality and weighted links are introduced, and these concepts can be used to evaluate co-authorship and citation networks, respectively (Kretschmer & Kretschmer, 2007).

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Callon et al. (1991) expressed that the basis of this type of analysis is the idea that the number of co-occurring words describes the content of the documents in the file. Since it is part of a larger network, it can be considered a cluster or node. This is because it is connected to other clusters or nodes in the larger network. It could be thought of it as a group of words that are connected to each other. It can also be thought of as a dense network that is more or less connected and strong. A method of analysis that examines how often each author's words are used together is called a "thematic map."

Thematic networks are represented in two dimensions, with the horizontal and vertical axes representing the centrality and density of the thematic network. The axes show the relevance of the theme in the study area and its evolution (Noyons, 2001; Zammarchi & Conversano, 2021). Centrality is a measure of how strong the connections of a cluster are to other clusters. The more connections and the stronger they are, the more that cluster is considered a group of important research problems identified by the scientific or technical community. A cluster is made up of many words, and density refers to the strength of the connections that link them all together. The stronger these connections are, the more research challenges associated with the cluster form a single whole. One could say that density is a good indicator of how likely a cluster is to stay together and grow over time in the field under study (Callon et al., 1991; Haustein & Larivière, 2015). Based on the research conducted in the introduction, it is clear that studies on hygiene education cover a wide range of subtopics. It is critical for future researchers, as well as thematic studies in this area, to determine if there is a pattern in these questions that cover a wide range of topics. This study will conduct a study on hygiene education based on bibliometric analysis.

The following research questions were asked:

1) What research, authors, contexts, and sources are the most important and most cited on the topic of hygiene education?
2) What are the popular topics in hygiene education today?
3) What are the research priorities in hygiene education?
4) What about coincidence, co-citation, and collaboration among nations in the field of hygiene education?

Research Methodology

General Background

To answer the research questions, a bibliometric analysis was conducted. According to Gokhale et al. (2020), a bibliometric analysis allows the reader to gain a comprehensive understanding of a particular field over some time. In this study, a bibliometric strategy was used that adhered to PRISMA guidelines (McInnes et al., 2018; Welch et al., 2016). Since the goal is to examine the most recent 10 publications in research, publications between the years 2012 and 2021 are used as the baseline. The Scopus database provides access to journal articles on hygiene education and the references cited in those publications, allowing the searcher to go both forward and backward in time. The database can be used for both collection building and research. In addition, the Sopus database provides suitable data for bibliometric analysis.

Data Sources

Science, social sciences, arts, and humanities are served by Scopus, a world-class research platform that facilitates the discovery, analysis, and dissemination of information. The Scopus database contributes to the efficiency and effectiveness of the research process by providing access to a wealth of information. In this case, the Scopus database was selected because it indexes the most prestigious journals in the fields of education, social sciences, and medicine, and also provides suitable data for bibliometric studies. The search was conducted on the Scopus database website using an online search engine. The search term "hygiene education" was chosen as the starting point. Various restrictions were then applied, such as language and time restrictions. The query string used for the search was:

TITLE-ABS-KEY ("hygiene education") AND (EXCLUDE (PUBYEAR , 2022)) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012)) AND (LIMIT-TO (LANGUAGE , "English"))

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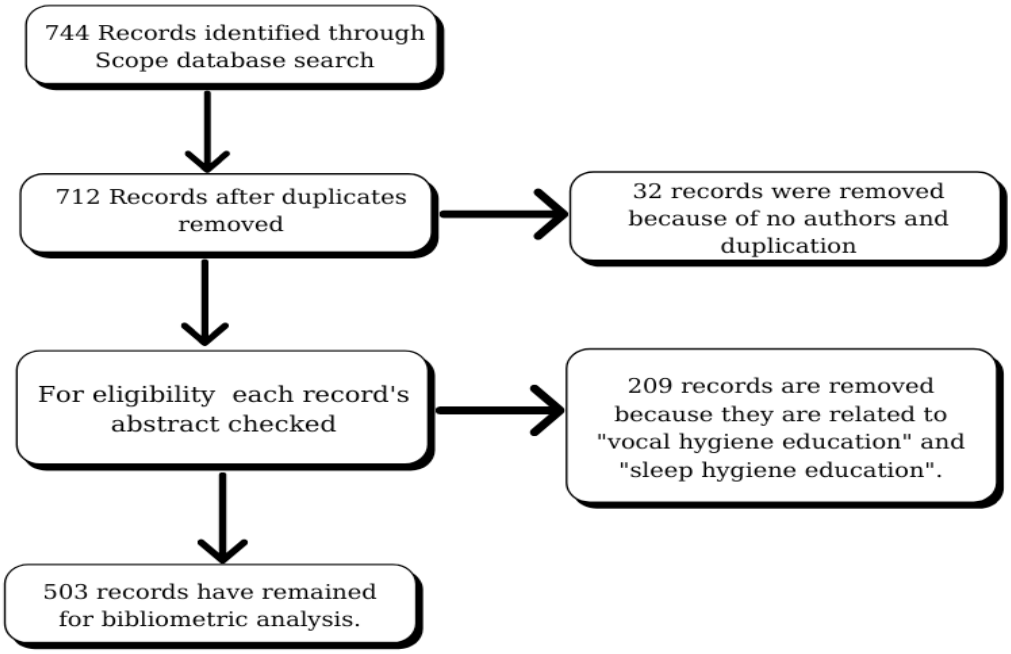
Figure 1
Flow Chart for Selecting Publication



Since the last ten years were decided as part of the research, the scans were made to cover the years 2021-2012, which corresponded to the research period. The data on the studies obtained as a result of the search were downloaded in both BibTex and CSV formats. Data were reviewed by opening the Excel file in CSV format. Studies with more than one study were identified. The related papers were manually deleted in both BibTex and CSV formats because they were a single publication. On the other hand, papers without an author were deleted. In this step, 32 records were deleted. In the next step, the title and abstract parts of each publication were examined. Studies on "vocal hygiene education" and "sleep hygiene education" were eliminated. In addition, studies that did not relate to hygiene education were excluded from the study. As a result of this process, 209 study data were deleted. 503 study data were remaining for the bibliometric analysis.

Data Analysis

It is possible to divide the bibliometric analysis into two categories. The first is the descriptive and performance analysis of the data. This study contains general information about the sources and document types used. Also, the number of studies and citations is estimated on an annual and total basis, providing statistical information. Then, depending on the top 10 or 20 studies, a list of the most cited studies is displayed. It is then offered to readers as the most prolific authors, sources, institutions, or nations. Second, scientific mapping and network analysis are used to perform the analyzes. The current bibliometric study was conducted using the shiny app for Bibliometrix, which is part of the R statistical package. It has many features that make it particularly suitable for conducting in-depth bibliometric analyzes of scientific publications. Web-based software that provides access to the features and functions of Bibliometrix 3.1.4 (Aria & Cuccurullo, 2017).

Research Results

The results are presented in the following order: general statistics first, followed by effective source, publication, and author information. The last section deals with the results of the scientific map.

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Table 2
Descriptive Information on Publication

Description	Results
Main Information About Data	
Timespan	2012:2021
Sources (Journals, Books, etc)	215
Documents	503
Average years from publication	5.04
Average citations per document	6.555
Average citations per year per doc	0.997
References	13177
Document Types	
article	471
review	32
Document Contents	
Keywords Plus (ID)	2751
Author's Keywords (DE)	1378
Authors	
Authors	1973
Author Appearances	2307
Authors of single-authored documents	23
Authors of multi-authored documents	1950
Authors Collaboration	
Single-authored documents	25
Documents per Author	0.255
Authors per Document	3.92
Co-Authors per Documents	4.59
Collaboration Index	4.08

As shown in Table 2, the statistics in the study span 2012-2021, or the last decade. In total, there are 2015 sources and 503 publications in this collection. According to the general data, there were an average of 5.02 publications per year. Each publication has cited an average of 6.5 times. These works cited a total of 13177 publications. Among these publications, there are 471 articles and 32 reviews. The authors used 1378 different keywords. The studies have 1973 authors. These authors have a total of 2307 appearances. Although there is only one author listed in each of the 25 publications, the "authors per document" value is 3.92.

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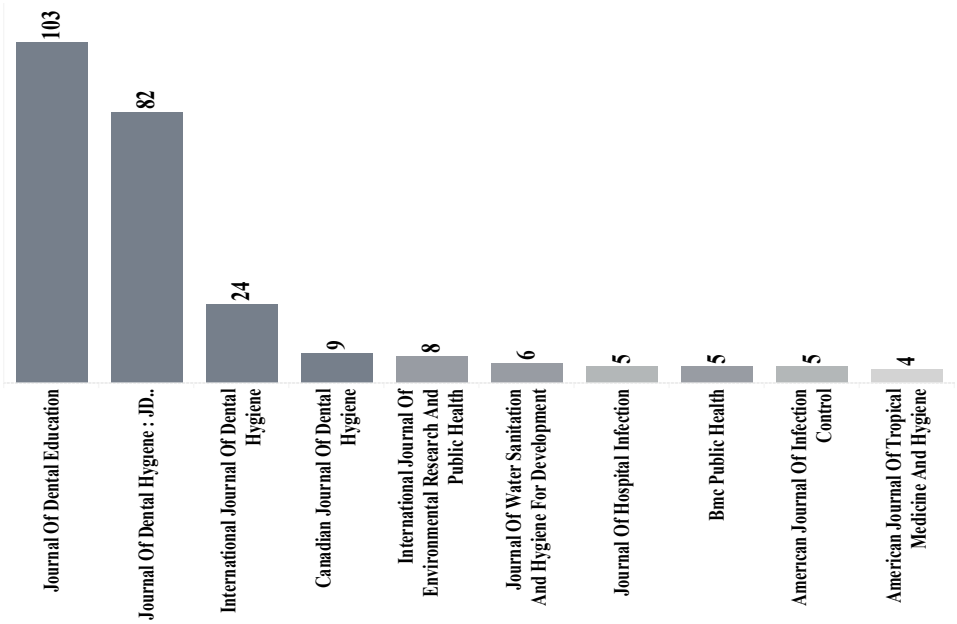
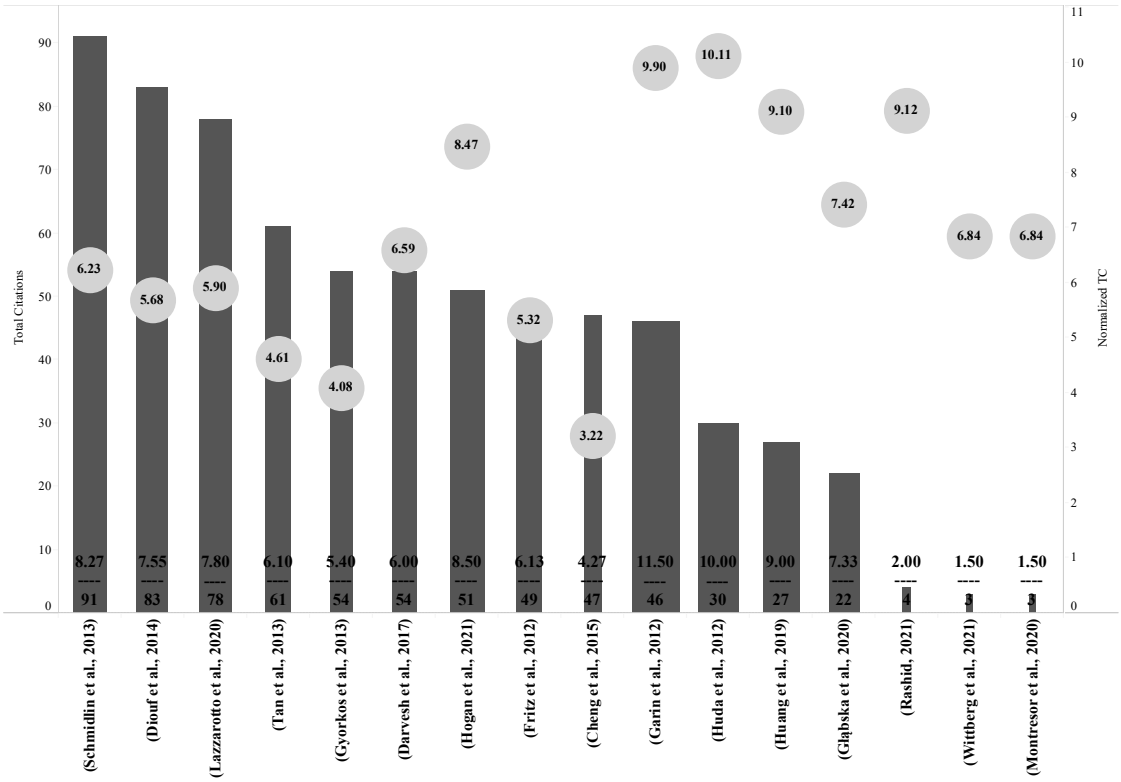
Figure 2
Top 10 Journals Based on Total Citations



The first four places on the list of the top ten sources in terms of the number of publications are occupied by sources on dental hygiene (Figure 2). The other six sources all relate to the topic of general health.

Figure 3
Effective Articles based on citation



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The effectiveness of the publications was determined by the number of citations. In Figure 3, the total number of citations is represented by the height of the blue bars of the publications. According to the width of the blue bars, the ratio of the number of citations per year is shown. The normalization of the total citations is represented by the red circles. When looking at total citations, Schmidlin et al. (2013) are at the top, while Huda et al. (2012) are at the top when years are put into proportion and normalized. Although the studies are related to hygiene education in some way, the specifics of the research are related to different areas. Nine of the sixteen studies (Cheng et al., 2015; Darvesh et al., 2017; Diouf et al., 2014; Garin et al., 2012; Głąbska et al., 2020; Huang et al., 2019; Montresor et al., 2020; Schmidlin et al., 2013; Tan et al., 2013) were directly related to the use of hygiene interventions to reduce the prevalence of a specific disease. Each study examined the impact of improvements in water, sanitation, and hygiene (Hogan et al., 2021; Wittberg et al., 2021) and hand hygiene (Fritz et al., 2012; Huda et al., 2012). Each study focused on a different aspect of general health education, a social responsibility initiative related to hygiene education, and knowledge, attitudes, and behaviors related to hand hygiene (Gyorkos et al., 2013; Lazzarotto et al., 2020; Rashid, 2021).

Table 3
Effective Authors Based on Citations

Element	h index	h index rank	g index	g index rank	m index	m index rank	TC	TC Rank	NP	PY start
Gyorkos Tw	3	5	3	12	0.30	36	113	1	3	2013
Fritz Sa	2	18	2	23	0.18	49	94	2	2	2012
Hogan Pg	2	19	2	24	0.18	50	94	3	2	2012
Gadbury-Amyot Cc	4	1	6	1	0.40	21	47	21	9	2013
Inglehart Mr	3	6	6	3	0.38	29	39	22	9	2015
Kinoshita A	4	2	6	2	0.36	34	39	23	7	2012
Bray Kk	4	3	4	9	0.40	22	34	26	4	2013
Li J	2	33	2	33	0.67	1	6	45	2	2020
Liu Y	2	34	2	34	0.67	2	4	46	2	2020
Aiemjoy K	1	47	1	47	0.50	3	3	47	1	2021

Note PY start: Year of publication by the author TC: Total citations NP: number of publications

In the analysis of the ten most effective authors in terms of effectiveness (as shown in Table 3), Gyorkos Tw, which ranks first in terms of a total number of citations, was first published in 2013. Gyorkos Tw's first published in 2013, which puts it in first place overall. In terms of the h-index, Gyorkos Tw is ranked fifth, while in terms of the g-index it is ranked 12th and in terms of the m-index, it is ranked 36th. By the h- and g-index, Gadbury-Amyot CC is the first author of the paper, which was first published in 2013. According to the m-index, it is ranked twenty-one. Li J. is ranked first in the m-index according to the m-index. The author's first study was conducted in 2020. Each index categorizes authors by a different method from the others. Based only on the total number of citations, older publications are considered favorable. Depending on the goal of the comparison, multiple indices may be used for comparison.

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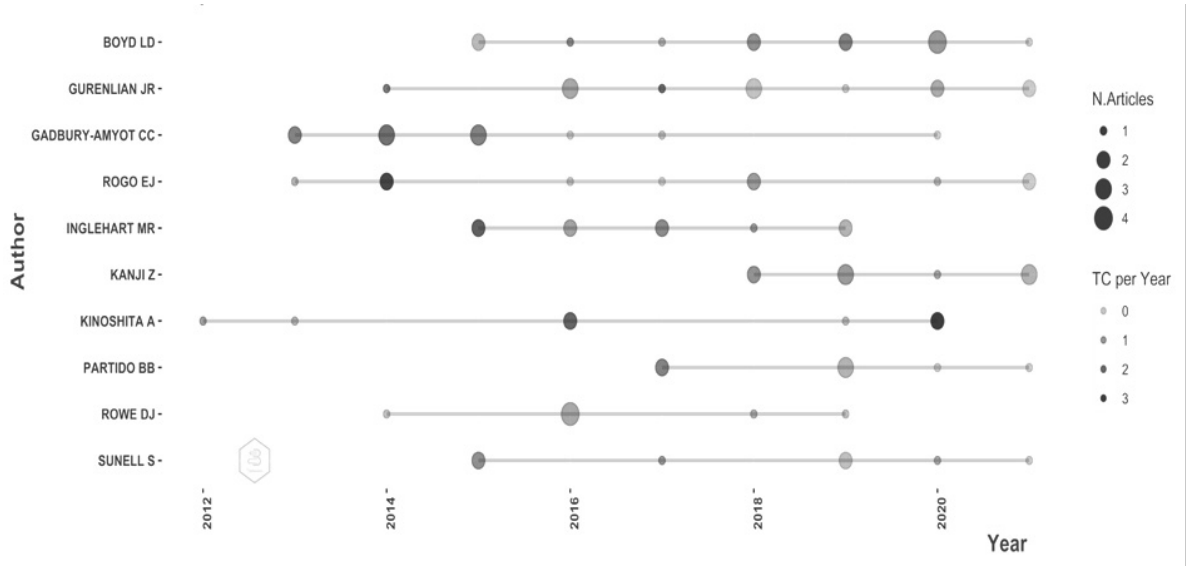
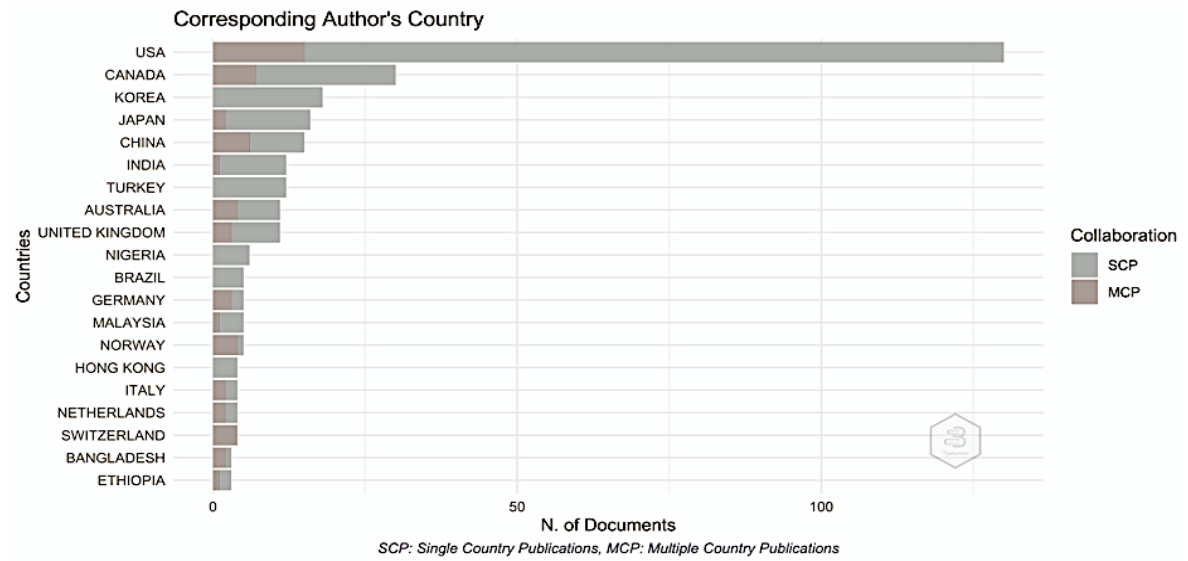
Figure 4
Top-Authors' Production over the Time



Reviewing the effectiveness of the writers is checked over time, and we find that Kinoshita A has been successful for nine years. Kanji Z and Partido Bb have been available for at least three years. The number of publications is indicated by the size of the circles in the illustration. At the same time, the blackness of the colored blue indicates that the number of citations has exceeded the annual average number. For example, Bayd Ld published four articles on this topic in 2020. Similarly, Rowe Dj published four articles in 2016. Looking at the average annual number of citations, Kinishita A has the most on the list in 2020 with an average of 3 citations. The annual citation rate for Rodo Ej was 2.78 in 2014, as shown in the data.

Figure 5
Corresponding Author's Country



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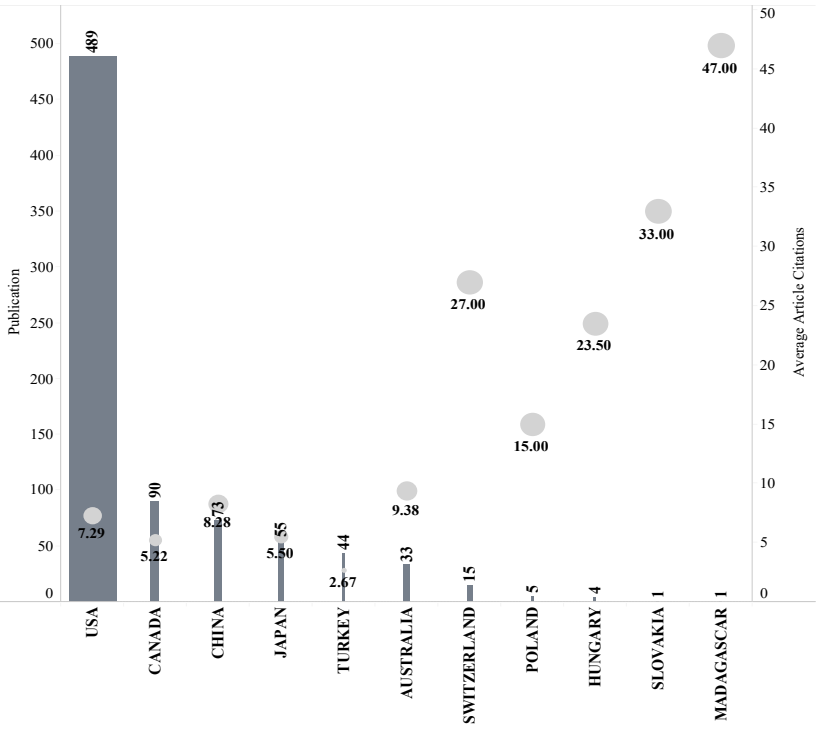
Looking at the distribution of corresponding authors by country, they are divided into two categories: one country and multiple countries. Switzerland has the highest MCP ratio in terms of proportion. As MCP, the number of publications is larger in the United States. In Korea, Turkey, Hong Kong, Nigeria, Brazil, and Hong Kong, all publications were classified as SCP.

Figure 6
Country Collaboration Network

When the cooperation between countries is examined, 2 clusters are formed. In the first cluster, the USA made the largest contribution. The second cluster includes Norway and Uganda. The size of the circles here represents the folding of the country, while the rest of the lines represent the cooperation between the two countries.

Figure 7
Country Contribution to Topic



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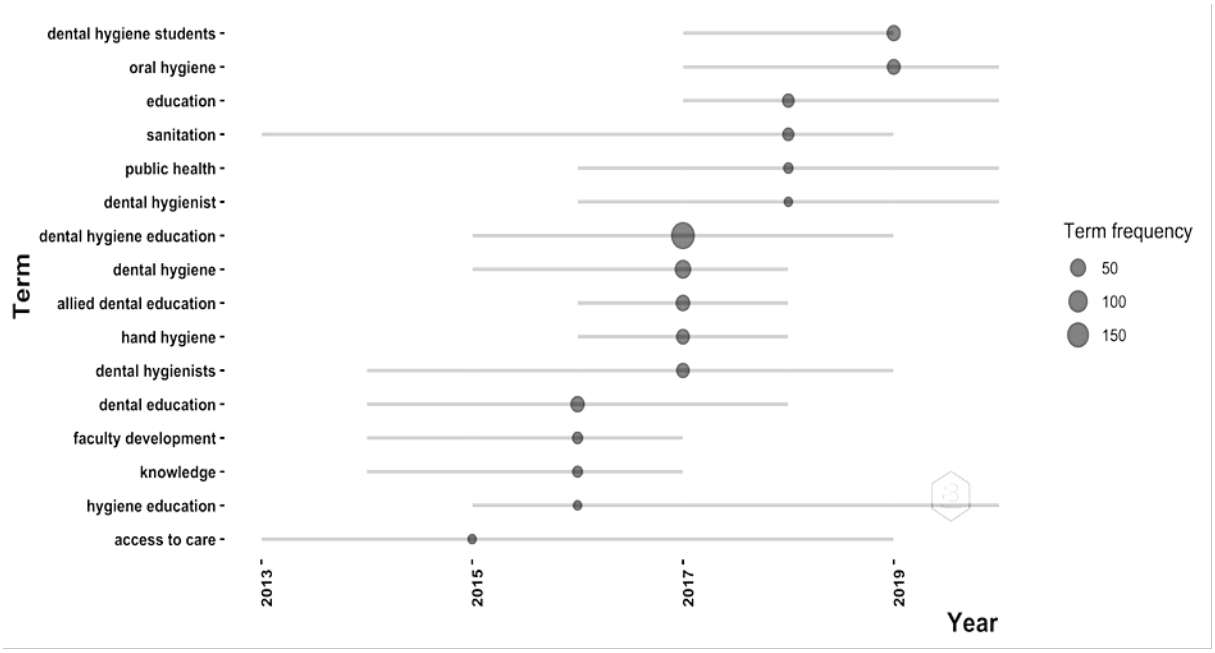
It is necessary to evaluate the number of publications produced by each country, as well as the number of citations received and the average number of citations per article. The total number of citations is represented by the height of the blue bars of the publications. The width of the blue bars shows the average citation per document. The normalization of total citations is shown by the red circles. The United States leads the world in both the number of publications and total citations, with Canada second and China third. In Sharma's Clean Water and Sanitation During the 2011-2020 study, China ranked first in total publications, while the United States ranked second. In terms of the average number of citations per document, the United Kingdom and Australia ranked first and second, respectively (Sharma, 2021). In terms of the average number of citations per publication, papers by authors from Madagascar and Slovakia were the most cited overall. Publications originating from Turkey saw the largest decreases. With a total of 44 publications, Turkey ranked 5th on the list of publications. However, the number of citations was only as high as Slovakia, which has only one publication, and the average number of citations per publication was the lowest of all the countries on this list.

Figure 8
Trend Topic on Hygiene Education



The calculations of the trend topics were performed under keywords. The terms "sanitation" and "access to care" have not been used in conjunction for years. Several terms such as "dental hygiene students," "oral hygiene," and "education" became more popular after 2017. While the term "dental hygiene education" was the most common, other keywords such as "dental hygiene" "allied dental education" and "hand hygiene" were also common.

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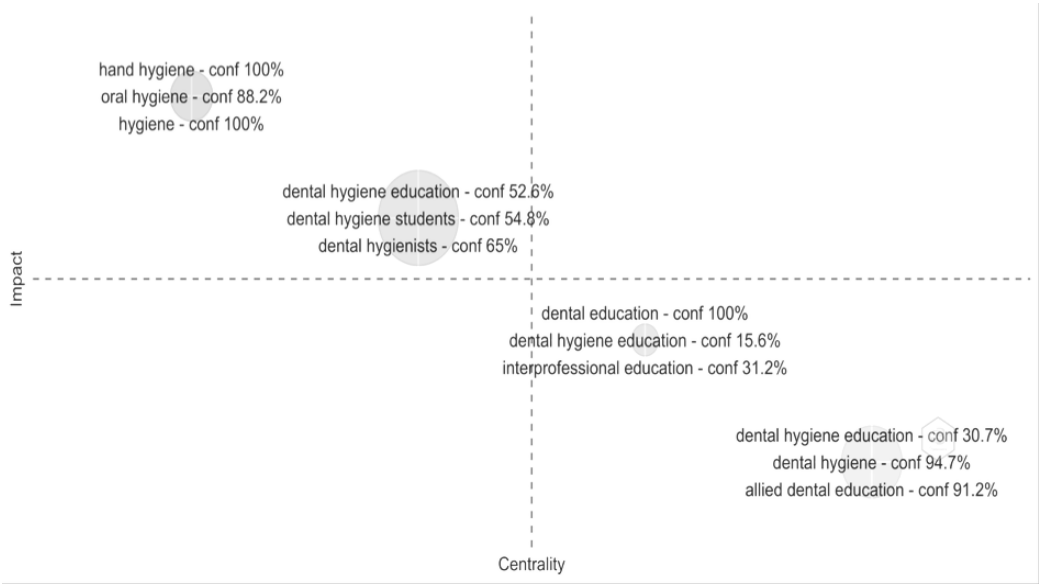
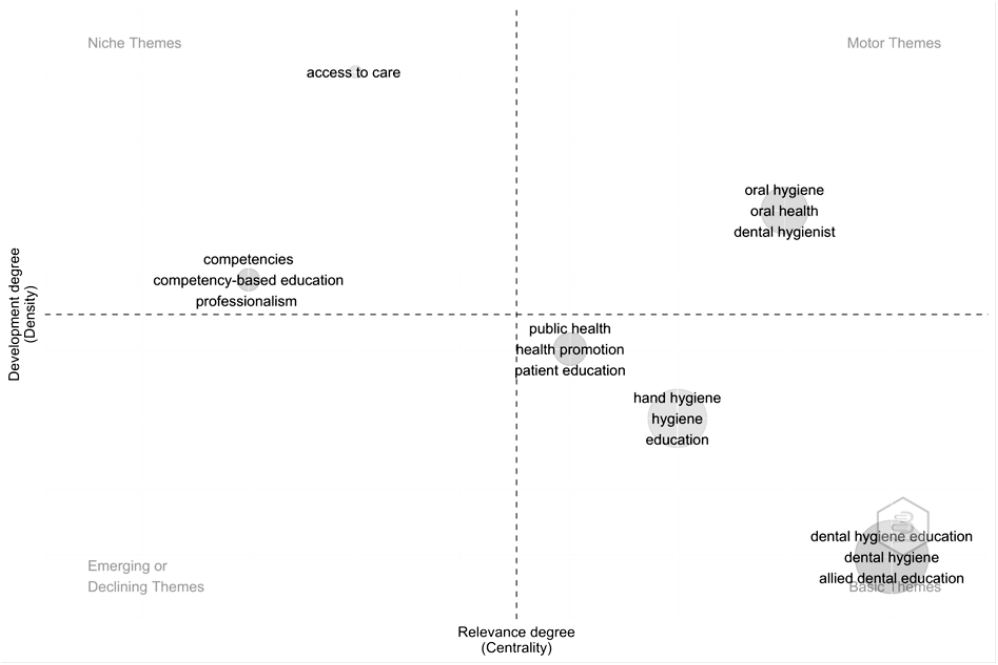
Figure 9
Clusters by Hygiene Education Documents Coupling



When the publications were classified according to the keywords used, the studies that included the terms "oral hygiene," "hand hygiene," and "sanitation" ranked lowest in terms of centrality but had the greatest impact. The impact of papers containing the terms "dental hygiene education," "dental hygiene students," and "dental hygienists" is slightly lower than normal, but the centrality is close to average. The centrality is above average, and the impact value is below average for the keywords "dental education," "dental hygiene education," and "interprofessional education." There was no cluster with a high impact value or centrality in the clustering. The frequency of keywords directly related to science education was not high enough to be associated with the themes formed.

Figure 10
Clusters by Hygiene Education Studies Themes



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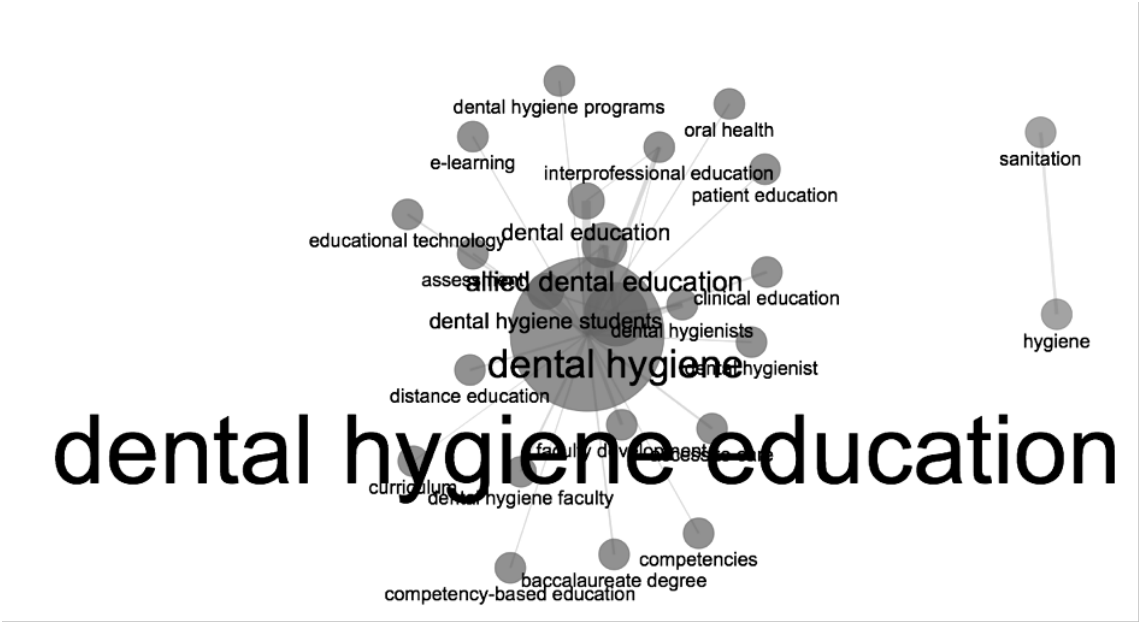
A cluster with low centrality and density, identified as a declining theme in the theme analysis based on the keyword, was not formed. The cluster that can be evaluated as a niche topic area includes the topics of competencies, competency-based education and professionalism, and access to care. These clusters are more isolated than other clusters. In classifying the basic topics, 3 clusters were formed. These include the topics of public health, health promotion, and patient education (González et al., 2020). The topics of hand hygiene, sanitation, and education are above average in centrality and just below average in density. The other cluster includes the topics of dental hygiene, dental hygiene, and dental education and has the highest centrality and at the same time the lowest density. In the cluster with high centrality and density, which is called the motor theme, 1 cluster is formed and includes the keywords oral hygiene, oral health, and dental hygienist. When viewed through the lens of science education, hygiene education studies do not dominate the conversation about "science education." Although hygiene and health education are considered closely related to the topic of science education (Arnold, 2018; Zeyer, 2012), collaborative research should be more prominent.

Figure 11
Co-occurrences network on Hygiene Education



The Co-Occurrences network is based on the use of terms in conjunction with each other. The size of the circle indicates how frequently it is used. The thickness of the connecting lines indicates how often they are used in conjunction with each other. As a result of the cluster analysis performed based on the results of the study, two groups were formed. In the large group, the color red represents the epicenter of oral hygiene education. The terms hygiene and sanitation are found in the blue category of keywords. It can be concluded that the majority of the studies were conducted in the context of oral hygiene education. This is supported by the fact that the most widely read journals are also included in this category.

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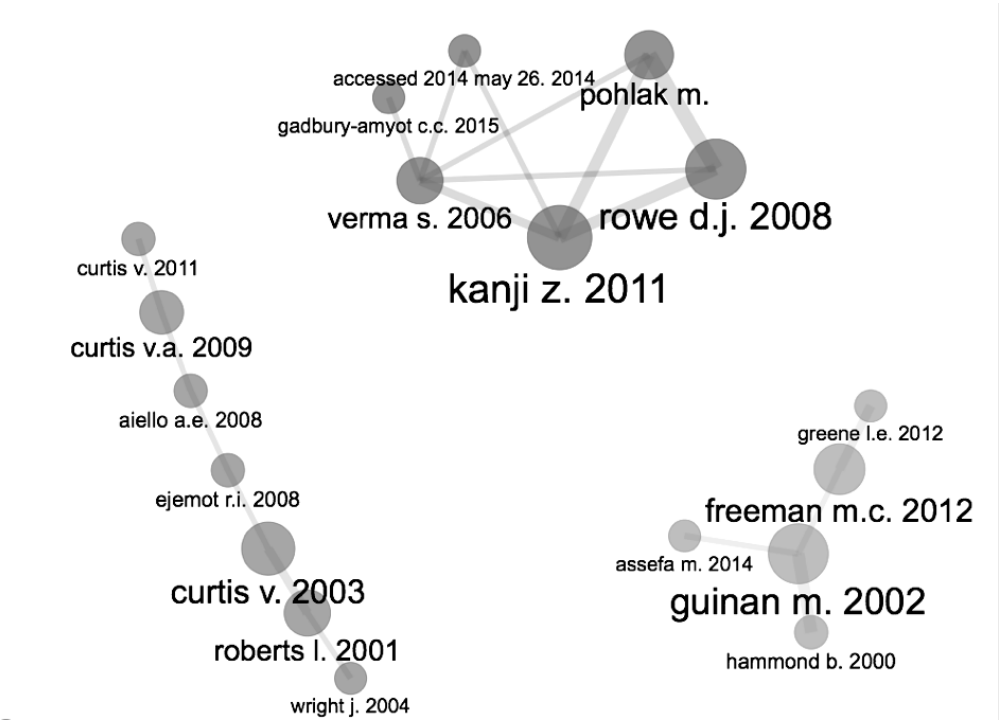
Figure 12
Co-citations Network



The analysis of the network of co-citations is based on common publications that studies share in reference lists. The thickness of the lines expresses the frequency of shared citations. It consists of 3 different clusters. The first cluster "A discourse on dental hygiene education in Canada" (Kanji et al., 2011) and "Educational and Career Pathways of Dental Hygienists: Comparing Graduates of Associate and Baccalaureate Degree Programs" (Rowe et al., 2008) are cited. been a group. There are 7 publications in the second group. Most notably, these include the publications "Hygiene in the Home: Relating bugs and behavior" (V. Curtis et al., 2003) and "Planned, motivated and habitual hygiene: a review of eleven countries" (V. A. Curtis et al., 2009). In the third cluster, "The impact of a comprehensive handwashing program on absenteeism in elementary schools" and "What factors need to be considered to help dental hygienists help their patients quit smoking?" (Freeman et al., 2012).

Conclusions

This article contains bibliometric reviews of hygiene education articles published between 2012 and 2021. This collection contains a total of 2015 sources and 503 publications. An average of 5.02 publications are published annually. The studies were authored by 1973 individuals. Dental hygiene-related sources occupy the top four spots on the list of the ten most influential sources based on the number of articles. The Journal of Dental Education ranks first in terms of the total number of publications related to hygiene education. While the studies are all relevant to hygiene education in some way, the details of the study cover a wide range of topics. Looking at collaboration among countries, two groups emerge. The United States made the largest contribution to the first group. Norway and Uganda are included in the second group. The United States leads the world in both publication volume and total citations, followed by Canada and China.

When publications were grouped by keywords used, articles using the terms "oral hygiene," "hand hygiene," and "sanitation" had the least centrality but the greatest influence. The influence of articles containing the terms "dental hygiene education," "dental hygiene students," and "dental hygienists" was slightly lower than average, but their centrality was close to average. Dental education, dental hygiene education, and interprofessional education are all highly relevant but have a poor effect value. The frequency of keywords related to science education was insufficient to correlate with the themes developed.

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The cluster that can be analyzed in the subject area collects information on competencies, competency-based education and professionalism, and access to care. These clusters are less interrelated than other clusters. Three clusters were identified when categorizing the Fundamentals theme. These are public health issues, health promotion, and patient education. The themes of hand cleanliness, hygiene, and education are more central than normal and slightly less dense than typical. The other cluster, which includes the topics of dental hygiene, dental hygiene, and dental education, has the highest centrality and also the lowest density. In the cluster with the highest centrality and density, a cluster is formed, which is called a motor theme and includes the terms oral hygiene, oral health, and dental hygienist. As a result of the cluster analysis conducted in response to the results of the study, two categories were formed. The color red represents the epicenter of oral hygiene instruction in the large group. The terms hygiene and sanitation are included in the blue keyword category. This indicates that most of the studies were related to oral hygiene instruction. This is also confirmed by the fact that the most widely read journals also fall into this category. Research on hygiene education has not dominated the discourse on "science education" when viewed from the perspective of science education. While hygiene and health education are considered closely related to science education, joint research should be more common.

Like previous bibliometric studies, this one provided insight into online hygiene education, previewed future research, and suggested opportunities for collaboration through analysis of historical study data. A systematic literature review of the relationship between hygiene education and science education can be conducted. The main limitation of the study is that only studies that were indexed in the Scopus database were included. There may have been studies that made a significant contribution to the topic of hygiene education but were not indexed by Scopus; therefore, these papers are not available. On the other hand, analyzes were performed using keywords chosen by the authors. If you substitute different terms formed in a larger context, you may get a variety of results. When conducting bibliometric studies on this topic, researchers can conduct a more comprehensive study by combining data from numerous databases. Future researchers are advised to consider the above groupings when selecting study topics. By relating their study topics to other topics, authors increase the visibility of their work in the field.

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