Bibliometric Analysis for Understanding the Correlation Between Chemistry and Special Needs Education Using VOSviewer Indexed by Google

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A B S T R A C T S

The "core science" is another name for chemistry. Special education is a type of instruction tailored to the needs of children who are eligible for such services. The goal of this study is to combine mapping analysis with the use of a VOSviewer. The application Publish or Perish is used to locate articles that are relevant to the search phrase. The keyword in this research is "chemistry" and "special education." Between 2017 and 2021, 1000 items were relevant. The number of "chemistry" and "special education" publications decreased in 2017, 2018, 2019, and 2020, according to the search results. In 2021, however, it fell once more. The findings of this study are likely to aid scholars in conducting research and selecting research topics.

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1. INTRODUCTION

Chemistry is also known as the "central science". Because chemistry connects physics with other natural sciences like geology and biology, it is known as the "central science" (Ali & Khan, 2017). The science of matter and its properties is referred to as chemistry. Organic, inorganic, physical, analytical, and biochemical are the five primary categories of chemistry (Ünak, 2016). Examples of chemistry in everyday life are discoloration of leaves, food digestion, common salt, ice floating on water, tears while chopping onions, sunscreen, medicines, hygiene.

Special education is a type of instruction that is specifically tailored to meet the requirements of kids who are eligible for special education services (Riccomini et al., 2017). Special education is provided to parents at no cost and includes the related services that students require to participate in their educational program (Smith, 2005).

Many researchers have conducted research using VOSviewer to conduct bibliometric research, including: Digital learning (Al Husaeni & Nandiyanto, 2022), computer science (Al Husaeni & Nandiyanto, 2023a), vocational school (Al Husaeni & Nandiyanto, 2023b), high school (Al Husaeni & Nandiyanto, 2023c), covid-19 research (Hamidah, 2020), scientific publications (Mulyawati & Ramadhan, 2021), chemical engineering (Nandiyanto et al., 2021), materials research (Nandiyanto & Al Husaeni, 2021), special needs education (Al Husaeni et al., 2023a), publication of techno-economic education (Ragadita & Nandiyanto, 2022), engine performance (Setiyo et al., 2021), dataset portrays decreasing number of scientific publications (Nandiyanto et al., 2020a), application in robotic hand systems (Castiblanco et al., 2021), research effectiveness in a subject area among top class universities (Nandiyanto et al., 2020b), educational research (Al Husaeni et al., 2023b), management bioenergy (Soegoto et al., 2022), magnetite nanoparticle (Nugraha, 2022), nanocrystalline cellulose production research (Fauziah, 2022), nano metal-organic frameworks synthesis (Shidiq, 2023), titanium dioxide nanoparticle synthesis (Nugraha & Nandiyanto, 2022), nanocrystalline cellulose (Maulidah & Nandiyanto, 2022), carbon nanotubes (Aldhafi & Nandiyanto, 2021), nano-sized agricultural waste brake pads (Deni & Nandiyanto, 2022).

The goal of this study is to combine mapping results using the VOSviewer tool to undertake a special education bibliometric chemistry study. This study is expected to aid and serve as a reference for researchers in conducting and determining topics for future research, particularly in the field of "chemistry" and "special education" keywords.

2. METHODS

The article data used for this study is based on research from publications that have been visited in Google Scholar-indexed journals. The utilization of Google Scholar is because it is a free resource. You can utilize the Scopus database in addition to Google Scientist, but Scopus is charged since it is a little difficult to access. In our next investigation, however, we will use the Scopus database. In data management, the Publish or Perish program is employed.

According to the title, keywords, and abstract requirements, the keyword "Special education" and "Chemistry" used to search for data is published or erased. As a result, 1000 articles were obtained and evaluated based on the chosen topic. The publications chosen were published between 2017 and 2021. After that, the articles are stored in *.ris format. In addition, the data is visualized and analyzed using a bibliometric map. Data from the prepared database source is then visualized in three ways: network visualization, overlay visualization, and density visualization.
3. RESULTS AND DISCUSSION
3.1. Research Development in the Field of Chemical Engineering Special Needs

Figure 1 depicts the structure of the research frequency curve for the term "chemistry" and "special education." In 2017, 2018, and 2019, the number of students enrolled in "chemistry" and "special education" fell. Then, it rose again in 2020, before dropping again in 2021.

In 2017, 2018, and 2019 the number of article publications discussing the keywords used decreased. In 2017 the number of articles published was 204 articles, then it fell to 200 articles in 2018 and fell again to 199 articles in 2019. In 2020 the number of publications regarding used keywords increased by 69 articles to 268 articles. However, in the following year, it decreased significantly to 129 articles.

![Graph showing research frequency curve for chemistry and special education between 2017 and 2021.](image)

**Figure 1.** Developmental level of research on “chemistry” and “special education”.

3.2. Clusters Resulting from The Vosviewer Mapping with The Keyword of Chemical Engineering Special Needs

The minimum number of relationships between terms in VOSviewer is set at least two. Based on the findings of mapping using VOSviewer with the keyword "chemistry" and "special education", there are five clusters. Each cluster has a unique color that indicates the cluster’s type. Each cluster is a circle of varying sizes. The size of the circle is determined by the frequency. The larger the circle, the more frequently the word is used in research.

The following is an explanation of the five clusters:

(i) Cluster 1 has 34 items marked in red color.

(ii) Cluster 2 has 25 items that are marked in green color.
(iii) Cluster 3 has 24 items marked in blue color.
(iv) Cluster 4 has 21 items marked in yellow color.
(v) Cluster 5 has 21 items marked in violet color.

3.3. Visualization Chemical Engineering Special Needs Topic Area Using VOSviewer

VOSviewer supports three types of visualizations: (i) Network visualization (Figure 2), (ii) Overlay visualization (Figure 3), (iii) Density visualization (Figure 4). Figure 2 illustrates the clusters of each of the issue areas studied as a network representation. In this work, the term "chemical special reduction" is employed. The geometry of the overlay visualization is depicted in Figure 3. In overlay visualization, we can obtain which year the study of the terms that we are looking for is most prevalent. The keyword here is "chemistry special education." The density visualization method is shown in Figure 4. Using density visualization, we can visualize how frequently the phrase will be used in research. The color of a phrase can be used to determine how frequently it is used. The more frequently a phrase is used, thus, the darker color can be gained.

![Network visualization of chemistry special education keyword.](image)

**Figure 2.** Network visualization of chemistry special education keyword.
4. CONCLUSION

The goal of this study is to merge high school mapping with VOSviewer software. The data for this study was gathered using the publish or perish reference manager application. The keyword "Chemistry" and "Special Education" is used to filter the information received. One of the bibliographic data used in this study was the topic, title, keyword, and abstract. We discovered 1000 articles from 2017 to 2021 that were relevant. According to the findings of
this study, the number of articles produced between 2017-2021 about high school declined from 2017 to 2018, while the number of articles published on keywords utilized increased in 2019. However, it will begin to drop again in 2021. More than 1000 citations have been found in some of the publications obtained. When you search for the term "chemistry special education," we can find five clusters, each with a different number of items. Each cluster is identified by a different colored circle. The size of the circle denotes how frequently the term is used or not.

5. AUTHORS’ NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES


