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Mapping literature of multicultural education: a bibliometric review

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ABSTRACT

The value of multicultural education is acknowledged on a global scale, despite the fact that various barriers prevent its complete implementation. These include cultural, linguistic, religious, economic, difference in physical condition, and ethnic backgrounds. By assessing publishing trends, extracting data on author keyword trends, examining conceptual evolution, and establishing possible future research on this topic using the Scopus database. This study found that publications grew in quantity from 2013 to 2022, decreased in 2015 and 2018 but were not significant, and 2021 was the highest peak with 221 documents. With 111 publications, the United States is the most prolific and co-authored with authors from Canada, China, United Kingdom, Germany, Australia and South Korea. Based on thematic evolution, 'subspace-clustering', 'conversational-system', 'aortic-aneurysm', 'Bayesian-network-classifier', are themes or topics that have recently developed. By utilizing these important terms, the study of multicultural education can be examined more thoroughly and more extensive in the future in order to learn new knowledge. In conclusion, this research has the potential to contextualize previous research on the topic and create an evidence-based practice paradigm for future studies grounded in science.

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1. INTRODUCTION

Conflict comes from cultural clashes when there is no respect and understanding for each other [1]. Education-related activities with a multicultural viewpoint are required to lessen this conflict. In all its forms, education is a social institution that reflects societal norms of privilege and marginalization [2]. As a result, they will grow in understanding and respect for one another and in developing a character that is accepting of differences. To assist schools in cultivating the kind of inclusive and open-minded culture that, if disseminated, can help create more peaceful, cohesive and democratic countries, pedagogical techniques such as multicultural education, peace education, and others have been developed [3]–[5]. In the twenty-first century, schools in most countries have experienced an increasing diversity of student populations. As a

result, the idea of 'multicultural education' has been established in many countries to provide more relevant and responsive schools to children from different cultural backgrounds [6].

Access to technology for historically underrepresented populations, such as children of color, children with disabilities, and poor children, is the subject of many studies on technology and equity in education [7]. As an important component of the modern world, "schools" should be created with the aim of appealing to every student in practically every way [8]. The promotion of equality in the classroom can foster a sense of equity and the consequences of diversity in the classroom [9]. The multicultural education paradigm includes the social justice paradigm, the equality paradigm, the *Bhinneka Tunggal Ika* paradigm [10]. Multicultural education grew out of the context of the "civil rights movement" which symbolized the search for educational justice to the forefront of people's lives [11]. Many empirical studies on multicultural education have been conducted [12]–[15]. The phrase "multicultural education" describes a collection of educational practices and materials that aid teachers in addressing the different issues brought on by a shifting and developing student body [16]. The goal of multicultural education is to shape students' personalities so that they accept all forms of difference from others [17].

A thorough bibliometric study was conducted in a number of subdomains related to multicultural education. These subdomains include: racial and ethnic diversity [18], race and gender [19], cross-disciplinary learning culture [20], social justice, equality and diversity [21], culture [22], ethnic identity and acculturation [23], equity in education [24]. The current study was produced, taking into account the growing importance of "multicultural education", especially in the last 10 years [25]. It was seen as an excellent opportunity to describe the current level of research on the topic and show the scientific community how it is developing [17]. The results show that many other scientific fields, including applied social sciences and environmental sciences, are increasingly interested in the "concept of multicultural education" [26]. Therefore, a bibliometric study was carried out in this study. Bibliometrics alone can be useful for researchers to provide in-depth analysis of related knowledge, bibliometrics is an extraordinary useful research instrument [27]. The current study carried out a bibliometric analysis of multicultural education: i) to assess publishing trends by year and country; ii) to explore information about author keyword trends; iii) to investigate conceptual evolution; and iv) to investigate future research directions for the topic researched.

2. RESEARCH METHOD

Bibliometric analysis has been demonstrated to be a reliable method for locating and analyzing research in the literature, as well as developing a system for studying literature to uncover publication patterns and trends [28]. To achieve the research objectives, three analytical programs-ScientoPy, VOSviewer, and SciMAT-were specifically employed in this study. The first important step that must be taken is the selection of the database and the retrieval of its metadata [29]. Metadata retrieval was carried out on August 9, 2022, on the largest abstract database in the world, namely Scopus in the last 10 years (2013-2022). In the Scopus database, 1,566 metadata were located. There is probably more than one document in the total number of documents displayed in the dataset section. Figure 1 displays a flowchart for data retrieval and gathering. Microsoft Excel, ScientoPy, VOSviewer, and SciMAT were used to create tables, graphs, and mapping charts to visualize bibliometric parameters for 1,563 data sets. In bibliometric analysis, the total number of metadata requirements varies substantially.

In the Python programming language, ScientoPy is a free and open source scientometric analysis tool [30]. To visualize the parameters that have been analyzed in a given study, ScientoPy uses five different forms of visual graphs, including timelines, bars, trend bars, evolution, and word clouds [31]. To account for the incoming data set, ScientoPy automatically creates pre-processing steps, including the number of articles per database both before and after the duplicate elimination filter is used [32]. In this study, bibliometric mapping made with VOSviewer is used to explore co-authorship by nation and co-occurrence of author keywords. According to [33], [34] the mapping method used by VOSviewer to convert data in comma separated values (CSV) format into diagrams or clusters includes visual components. This study maps visual elements using VOSviewer software, which converts the captured data into clusters in CSV format [35]. Co-occurrence analysis was used to identify the author's keywords. Nodes stand for publication frequency, whereas connection width denotes the degree of link [33]. SciMAT is a unique software that analyzes scientific articles to follow field structure, growth, and key intervening factors [36]. In addition, it provides a number of pre-processing methods to troubleshoot raw database data [37], based on the recommendations of Cobo *et al.* [38].

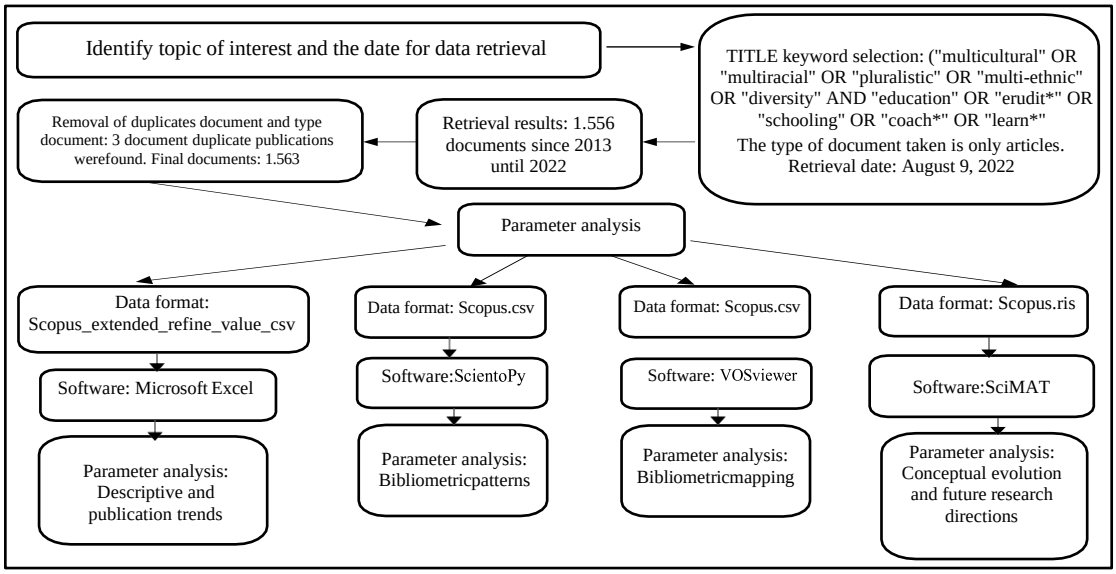


Figure 1. The flowchart of data collection and data retrieval [28]

3. RESULTS AND DISCUSSION

Before beginning the bibliometric analysis, this study identifies certain less evident publication descriptors, such as the leading author, the kind of source, the language, the subject area, and the source of funding. In addition, it is important for future readers and researchers to understand the importance of the research theme. In addition, it may attract the attention of future academics who are interested in refining the parameters that affect the growth or decline of year-based publications. There were 1,563 publications on multicultural education written by 159 authors starting from 2013. Table 1 lists the author details, organized by number of publications, for authors who have at least five documents on this subject to be analyzed. With 12 publications, the findings show that Günay and Aydin [8], is the most prolific writer. This study recognizes that, the national Natural Science Foundation of China (NSFC), is the main source of funding for research by providing a total of 35 funding to researchers related to multicultural education [39].

Table 1. Active authors

Author	Affiliation and country	H-Index	Citation	DE	DME
Aydin, H.	Florida Gulf Coast University, Fort Myers, United States	33	3577	50	12
Abduh, A.	Universitas Negeri Makassar, Makassar, Indonesia	10	402	34	6
Whiting, E.F.	Brigham Young University, Provo, United States	12	666	29	6
Basri, M.	Universitas Negeri Makassar, Makassar, Indonesia	9	224	6	5
Cutri, R.M.	Brigham Young University, Provo, United States	13	694	20	5

DS: Document in Scopus; DME: Document related multicultural education

Figure 2 shows the 10 most active scientific sources in publishing articles on multicultural education. These ten scientific sources have published as many as 166 (10.62%) documents out of a total of 1,563 documents. Multicultural Education Review is the most active scientific source with a total of 30 (1.92%) documents that they have published. Next, Multicultural Perspectives with 27 (1.72%) and the International Journal of Multicultural Education with 21 (1.34%) documents are ranked second and third.

Each year, it is important to keep an eye on publishing trends to find potential areas for further research. Future readers and potential researchers should be aware of the significance of the research theme. Future academics interested in adjusting for factors influencing the growth or decline of year-based publications may also be interested in it. In 10 years, the publication of academic texts related to multicultural education continues to grow in quantity from 2013 to 2022. Almost every year, more than 100 documents have been published in various scientific sources. In 2013, a total of 113 (7.23%) documents were published. This shows that the interest of researchers around the world is quite high. Those documents that are entered in the Scopus database, of course, in other databases, such as Google Scholar, ERIC, Web of Science (WoS), there are more documents recorded. The trend of publications tends to increase every year in the last 10 years until this research is carried out; 2021 was the highest peak with 221 (14.14%) documents

published. Although there was a decrease in 2015 and 2018, it was not significant. The number of documents in 2022 is 151, there is a possibility that it will increase until the end of the year by looking at the published trends that have been analyzed.

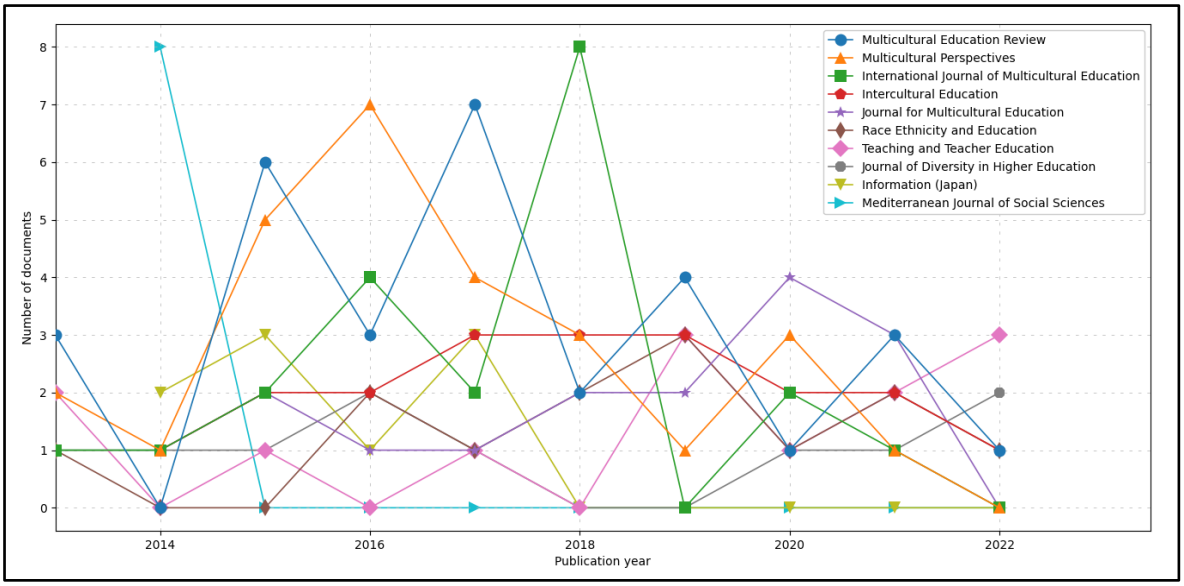


Figure 2. The 10 most active scientific sources in multicultural education publications

Academics from 90 different nations have shared research on multicultural education. With 565 article documents, authors from the United States contribute more scholarly work than any other country. With 111 publications, the United States is another significant related country. Figure 3 shows the results for the top 10 countries as well as the percentage of documents published in the previous two years (2020 to 2021). With the help of a network map created with VOSviewer, Figure 3 illustrates the co-authors' contributions to research on multicultural education by state. Co-authorship often refers to a scientific collaboration between two or more authors on a publication to complete a specific research-related task. Co-authors act as surrogates for collaboration in data collection, modeling, and decision making for management and policy. For each country, Figure 3 shows the total strength of co-authorship links with other countries to be calculated. The country with the greatest total link strength will be selected. The minimum number of 30 documents owned by the state and the minimum number of citations is 1, found by 15 countries related to multicultural education research. Meanwhile, Figure 4 shows the keywords that authors often use. The bigger and bolder the keyword indicates it is the most used.

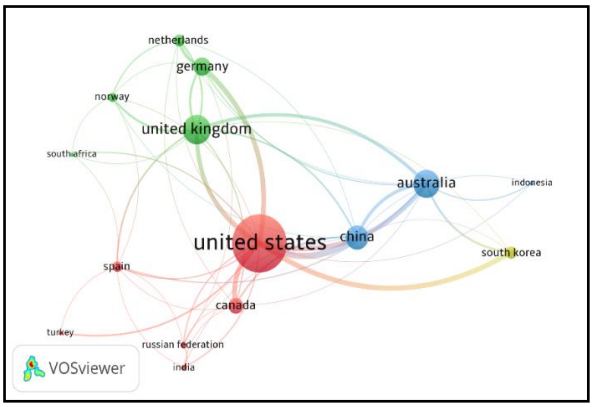


Figure 3. Network visualization of the co-authorship by countries

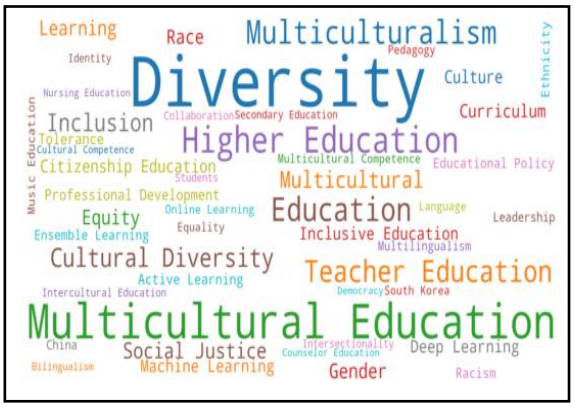


Figure 4. Word-cloud of authors' keywords

"Author keyword" refers to the keywords used by the author to accurately describe the content of the document. Author keyword suggestions help readers and potential researchers find important parts of the published work. Author keywords are used by many electronic search engines, databases, and journal websites to find related papers. Using the author's keywords, ScientoPy can then follow the development of the study topic or search argument. The authors' previous research keywords are examined in this section. The workflow is completed by identifying research trends based on the author's keywords. Similar terms with English and American spellings as well as singular and plural keywords have been suggested to be combined. Authors can create more specific phrases for conducting analysis and delivering accurate information regarding metadata by using the manual process carried out in eliminating redundant data by the thesaurus file. The keyword "Diversity" appeared most frequently in 267 papers. "Multicultural Education" is the second most frequently used term, appearing in 176 articles. Figure 5 and Table 2 shows the five periods of keyword distribution.

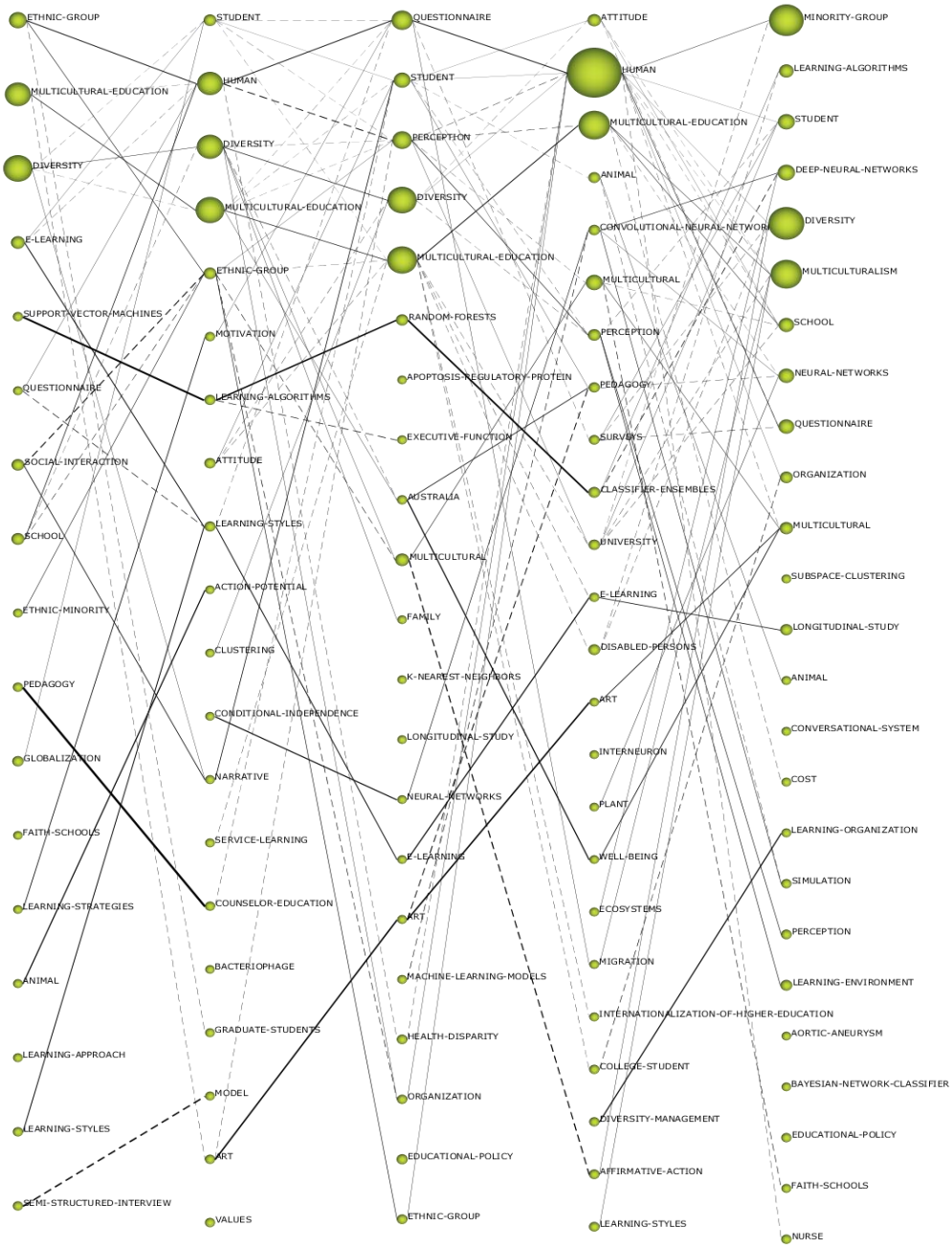


Figure 5. The thematic evolution of research during five consecutive periods

The development of many topics, which are divided into chronological eras, illustrates the interrelationships between themes from various eras. Continuous lines used to represent conceptual linkages demonstrate connections based on concepts. Relationships based on keywords and denoted by dotted lines are nonconceptual. The number of subjects or keywords that matched is also shown by the line thickness. It contains more themes or keywords as it becomes bolder. The five knowledge base periods in this study are: P1 (2013-2014), P2 (2015-2016), P3 (2017-2018), P4 (2019-2020), and P5 (2021-2022).

Table 2. Thematic evolution

Period	Year	Keywords
Period 1	2013-2014	Ethnic-group, multicultural-education, diversity, e-learning, support-vector-machines, questionnaire, social-interaction, school, ethnic-minority, pedagogy, globalization, faith-school, learning-strategies, animal, learning-approach, learning-style, semi-structured-interview
Period 2	2015-2016	Student, human, diversity, multicultural-education, ethnic-group, motivation, learning-algorithms, attitude, learning-style, action-potential, clustering, conditional-independence, narrative, service-learning, counsellor-education, bacteriophage, graduate-students, model, art, "values"
Period 3	2017-2018	Questionnaire, student, perception, diversity, multicultural-education, random-forests, apoptosis-regulatory-protein, executive-function, Australia, multicultural, family, k-nearest-neighbors, longitudinal-study, neural-networks, e-learning, art, machine-learning-models, health-disparity, organization, educational-policy, ethnic-group
Period 4	2019-2020	Attitude, human, multicultural-education, animal, convolutional-neural-network, multicultural, perception, pedagogy, surveys, classifier-ensembles, university, e-leaning, disable-persons, art, interneuron, plant, well-being, ecosystem, migration, internationalization-of-higher-education, college-students, diversity-management, affirmative-action, learning-styles
Period 5	2021-2022	Minority-group, learning-algorithms, student, deep-neural-networks, diversity, multiculturalism, school, neural-networks, questionnaire, organization, multicultural, subspace-clustering, longitudinal-study, animal, conversational-system, cost, learning-organization, simulation, perception, learning-environment, aortic-aneurysm, Bayesian-network-classifier, educational-policy, faith-schools, nurse

3.1. Discussion

In order to stimulate additional discussion and the development of strategies and approaches for handling differences that are relatively challenging to resolve and necessitate extra effort, we present an overview of research that has been undertaken and published. The topic of multicultural education in the last ten years has produced 1,563 Scopus indexed documents and attracted 159 authors worldwide. Aydin, a member of Florida Gulf Coast University in Fort Myers, Florida, is the most prolific author on munticultural education with 12 scientific works in the Scopus database. In 2017, he wrote a manuscript entitled: "The educational needs of and barriers faced by Syrian refugee students in Turkey: a qualitative case study," is his most cited article with 153 citations. The NSFC aims to support fundamental research, encourage unrestricted inquiry, find and nurture scientific talent, advance science and technology, and ensure the harmonious socio-economic growth of the country [40].

The development of publications over the last ten years is quite growing, this is indicated by more than 100 articles published every year. This can be supported by the assertion [41], revealing that multicultural education often appears to represent a shift from who has the power to define problems, issues, jobs, and the goals of the work. Education professionals and academics do not yet have access to publicly available and validated survey instruments based on a critical conceptual understanding of the multicultural school climate [42]. At the global level, an additional challenge is that the field of multicultural education is dominated by a United States perspective, which is when multicultural education comes to the fore. Cultural differences in society also bring new challenges in education. Dialogue and peace in society depend on training individuals dealing with education [43], as well as promoting constructive and cooperative relationships among children from different cultural and linguistic backgrounds [44], [45].

Of all the countries, the United States produces the most scientific research on multiculturalism. Canada, China, Britain, Germany, Australia, and South Korea are close allies of the United States. In the United States, multicultural education has always been political. It was inspired by the civil rights struggle and developed in the 1970s (and in Canada by the debate about the diverse citizenships of cultural minorities). In this view, it is impossible to understand multicultural education in a socially or politically neutral manner. In reality, no educational philosophy is useful unless it emphasizes improving student achievement as a whole and giving them the opportunity to fully participate in society. These include the recent evolution of the concepts of culture and cultural hybridity; the difference between biological and sociological conceptions of 'race', postmodern understanding of identity and subjectivity; and an ethnographic account of how students' school experiences are shaped by globalization, immigration, classroom culture, and other factors. Also, the combination of privileges enjoyed by native English-speaking white children in the United States is often underestimated, and the literature has not addressed it carefully [46].

According to thematic evolution, "subspace-clustering", "conversational-system", "aortic-aneurysm", "Bayesian-network-classifier", are themes or topics that have recently developed. These crucial terms have advanced the field of multicultural education research. It is seen that certain themes, especially those related to subspace grouping, speech systems, aortic aneurysms, Bayesian tissue classifiers, are of increasing importance. These themes or topics need further research in order to obtain the latest, more comprehensive information in education, especially multicultural education.

4. CONCLUSION

The parameters analyzed in the results and discussion of course become valid data based on the results of data processing carried out by third parties. The statistics of this publication provide an illustration that the existence and position of multicultural education continues to develop according to the times. Future researchers should investigate these terms in more depth using scoping studies or a comprehensive literature review to understand their relationship. This study only serves as a starting point for further analysis of the subject matter. The findings of this study can provide a theoretical framework for the problem, an overview of the state of the art, and predictions of future research gaps. The potential for future research on multicultural education, including a thorough investigation of the specific issues raised in this study, is an important aspect of this scientific analysis.

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