

Exploring Differentiated Learning: A Bibliometric Examination of Research Development and Directions

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Abstract

Purpose: To chart the progress and trajectory of differentiated learning research in Scopus database-indexed publications from 1954 - 2023. The first publication was found in 1994.

Methodology: Using bibliometric analysis method. A literature review was performed to ensure that relevant research on bibliometric topics was conducted. A Boolean search engine was utilized to search the Scopus database from 1954 to 2023. The analysis of citations, document content, and networks was carried out using R and Rstudio tools, VosViewer, and Microsoft Excel. Using the Boolean operator TITLE-ABS-KEY (differentiated and learning) to search Scopus and generate 7,012 documents. Filtering is done with the Boolean operator (LIMIT-TO (SUBJAREA, "soci")) AND (LIMIT TO (DOCTYPE, "ar")) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT TO (LANGUAGE, "English")) for social science field restrictions, source documents are only journals and articles in English, resulting in 1. 425. analysis using Scopus, R, and Rstudio to determine the number of articles per year, per journal, author, affiliation, country, and topic/sector. To visualize using VOSviewer and Microsoft Excel data processing.

Results: 848 publications matched the function, subject, and criteria set. Annual growth rate of 7.33%, most publications in 2022 by US country with affiliation from University of Toronto US. Jordan J was the most prolific author.

Applications/Originality/Value: This bibliometric analysis is limited to Scopus data. Other national and international databases should have been considered in this study. This research offers a concise summary of the available literature for researchers engaged in differentiated learning and offers suggestions for future research endeavors.

Introduction Section

Learning styles are how students perceive and experience the most effective and efficient processes of storing and retrieving what they have learned (R. Rahayu, 2022). A learning style is also the fastest and most appropriate way of absorbing information while learning (Baum et al., 2001). By recognizing students' learning styles, teachers can design learning activities with various appropriate methods (Biggs & Kirby, 1983). Some learning styles that students have are auditory, visual, and kinesthetic (Cahya et al., 2023). Students with an auditory learning style usually find it easier to understand information and concepts according to their sense of hearing, so they will feel happy if they are invited to discuss, read aloud, play roles, and learn by using audio-based media (Marlina, 2019). Unlike students with a visual learning style, they usually rely more on their sense of sight (Khoeron et al., 2016). Whereas students with kinesthetic learning styles are more effective if they learn independently, they prefer to practice in every lesson to be actively involved (Mukrimaa et al., 2016).

Differentiated learning is learning by adjusting between learning strategies and student learning needs, such as interests, learning preferences, characters, learning styles, and student readiness to improve learning outcomes (Biggs & Kirby, 1984). If this is not considered, students will experience many failures in receiving information (Benner et al., 2020). Even worse, the learning process is not conditioned, and the targets must be achieved optimally (Blair & Somerville, 2009). Differentiated learning is also a way to prepare learners who can learn in all situations, so they need to be trained early on utilizing all circumstances in learning materials that can improve their skills and will be helpful in the future (Handiyani et al., 2022). In addition to fulfilling students' learning needs, differentiated learning can also improve students' creativity and skills according to their interests and talents. (Abdullah et al., 2015). It is important to critically analyze existing research to provide direction for future research and present predictions that help educators understand students' learning styles. This evaluation process is of course determined by the availability of data from scientific research activities and the accuracy of the data. Bibliometric indicators are one of the tools that have a role in reviewing the results of scientific research, examining the relationship between science

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and technology, compiling a mapping of scientific fields, tracking/tracing the development of new knowledge in a field, and as a forward-looking indicator in making strategic planning. (Apriantoro, 2023; Apriantoro et al., 2023).

The purpose of this study is to map the development and direction of differentiated learning research in publications indexed in the Scopus database from 1954 - 2023. based on the findings of the Scopus database, 1994 was chosen as the starting year because the first publication on differentiated learning appeared in that year.

Previous research on the Qur'an memorization method focused more on implementation and evaluation, some of which stated that the CIPP evaluation model was the most effective because CIPP evaluation includes context, input, process and product (Farhana et al., 2017). Other research states that memorizing the Qur'an can use a variety of methods; there are muroja'ah, talking, wahdah, sima'I, and muroja'ah (Akhmar et al., 2021) and tiktirar (Budianti, n.d.). In addition, Al-Qosimi is also a method that can have a significant effect on learning to memorize the Qur'an (Sabiq et al., 2020). Unlike the case with tahsinul Qur'an learning, in tahsinul Qur'an learning, globally, many use the Iqro method (Nahar et al., n.d.). In the tahsinul Qur'an method, the teacher begins by reading, and the students then listen and imitate the teacher's instruction. At the end of the lesson, students will be tested individually on reading comprehension by the teacher. Essentially, this method aims to enhance and beautify the reading skills of the students (Prasetyawan, 2016).

Unlike the tartil method in learning the Qur'an, the tartil method starts by introducing letters, punctuation marks and reading laws. It is hoped that students can read the Qur'an properly and correctly according to the rules of tajweed science and can also facilitate reading (T. Rahayu et al., 2020). The tartil method is one of the alternative methods to eradicate illiteracy (Syafri & Yaumas, 2017). Using various methods is part of Qur'an learning management (Akmansyah, 2018).

There needs to be more research that examines the selection of methods by considering students' learning styles. Whereas both have a close relationship that will determine the level of student success in the learning process (Safrianti, 2017). Other problems show that there are still many Islamic schools that have not been able to manage the tahfidzul Qur'an program properly, especially regarding the methods applied, causing the quality of reading the Qur'an in the community to remain low (Marlina et al., 2023).

Assessment in differentiated learning is one of the essential instruments to be implemented in schools; with the implementation of assessment through differentiated learning, teacher problems can be adequately minimized, and assessment through differentiated learning can increase teacher understanding of students (Marlina et al., 2023). Differentiated learning can be applied in subjects such as science, maths and science (Suwartiningsih, 2021), PAI and ethics (Asaatidzah_E2_2, 2021). Differentiated learning can optimize students' learning needs and outcomes (Herwina, 2021). In the new curriculum, the independent curriculum as it is today, not so many teachers have implemented differentiated learning even though they are very enthusiastic about participating in the training (Digna et al., 2023).

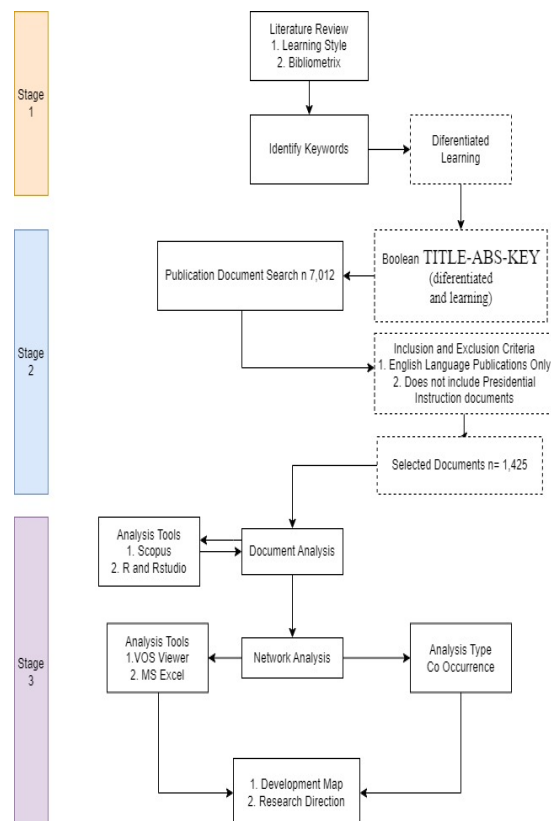


Figure 1. Research Procedure

Previous research on differentiated learning in memorizing the Qur'an using bibliometric analysis research methods has yet to be used as an effort to map scientific publications in various existing studies. Most of the previous studies are still zero using bibliometric analysis, especially related to Qur'anic learning. The researcher's attention is directed to the context of differentiated Qur'anic memorization methods because research on this issue still needs to be completed. The Qur'an memorization program is the target of many student guardians. However, there needs to be more alignment between stakeholder expectations of school progress through the Qur'an memorization program and efforts to make it happen. Being a Qur'an memorization educator is challenging; some feel it is not their field, while others are competent but too heavy and difficult to perceive.

Document Analysis

Essential Information About the Data

Table 1 presents a summary of 1781 documents gathered over a period of 69 years. This encompasses 4320 authors, 466 of whom are single authors, along with 14.32% of international authorship collaborations. Furthermore, the documents contain 76979 references, with an average of 22.25 citations per document.

Table 1. Main information data

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1954:2023
Sources (Journals, Books, etc)	848
Documents	1781
Annual Growth Rate %	7,33
Document Average Age	9,92
Average citations per doc	22,25
References	76979
DOCUMENT CONTENTS	
Keywords Plus (ID)	2504
Author's Keywords (DE)	4791
AUTHORS	
Authors	4320
Authors of single-authored docs	446
AUTHORS COLLABORATION	
Single-authored docs	466
Co-Authors per Doc	2,64
International co-authorships %	14,32
DOCUMENT TYPES	
Article	1781

Documents by Year

Figure 2 shows the development of publications on the theme of differentiated learning by year. Documents on differentiated learning first appeared in 1954. Publications on differentiated learning stagnated from 1954 to 1994. At the same time, the publication peak occurred in 2022, reaching 177 documents. The second peak is in 2021 with 171 documents and the third peak is in 2020 with 143 documents.

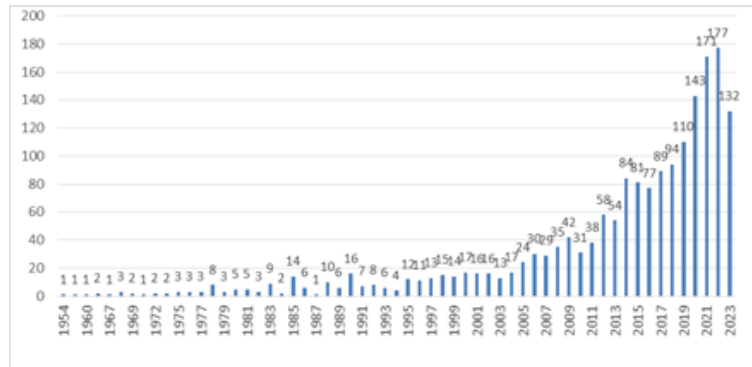


Figure 2. Documents by Year

Most Relevant Authors

Figure 3 shows the ten most influential authors in publications on differentiated learning. Struyven, K and VanTassel-Baska, J lead with eight publications, Pozas, M and De Neve, D with five documents each. The next six authors have the same number of documents at 4 documents, those authors De Neve, D. Fraser,B.J., Gallagher,T.L.,Gibbs,K, Griful-Freixenet,J.,Heng,T.T.

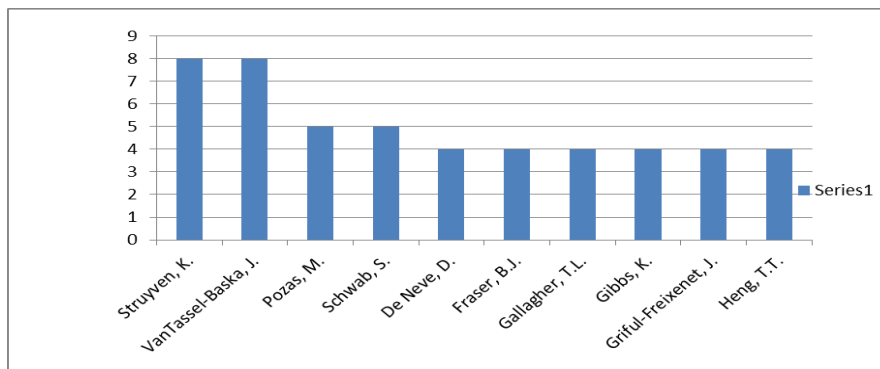


Figure 3. Most Relevant Authors

Documents by affiliation

Figure 4 shows the ten most influential affiliations in publications on differentiated learning. The University Of Hong Kong is the highest affiliation, followed by The University of Texas as the second rank and the University of Melbourne as the third affiliation in publications on differentiated learning. Brock University and the Chinese University of Hong Kong are ranked last.

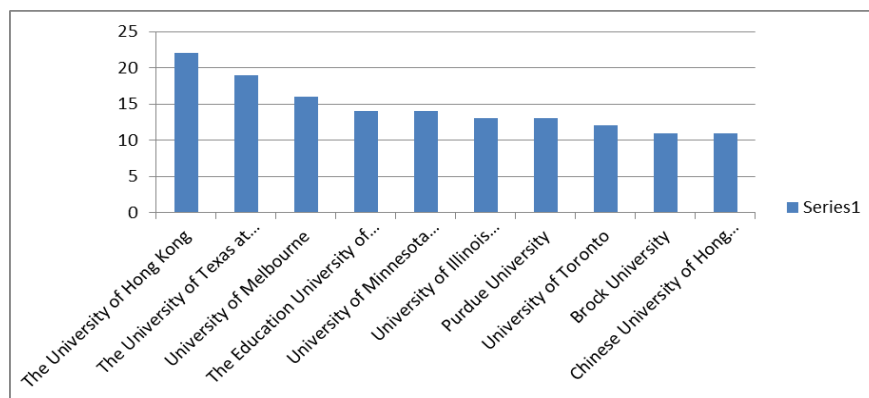


Figure 4. Documents by affiliation

Documents by country

Figure 5 illustrates the distribution of publications by country within the theme of differentiation and learning. The United States stands out as the leader with a total of 580 published documents, while Canada and the United Kingdom follow with 170 documents. From the data, it can be seen that the difference in the number of documents by year between the first and second rankings is very significant. European countries collectively represent the highest number of publications, with a total of 4 countries contributing significantly. Meanwhile, countries in the Americas and Asia rank second in terms of publication frequency. This observation underscores the popularity of research on differentiation and learning within the European continent.

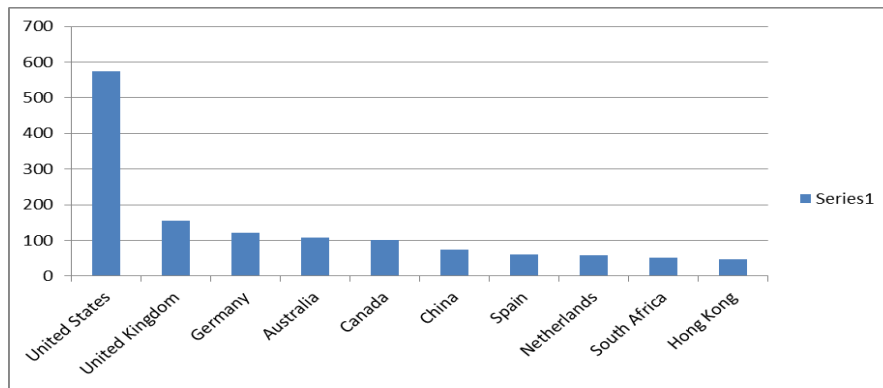


Figure 5. Documents by country

Documents by source

Figure 6 illustrates the sources of the documents, indicating that the majority of the documents originate from Sustainability Switzerland, totaling 20. Next is the Journal Of Learning Disabilities, where there are 18 documents, and the International Journal Of Science, with 15 documents.

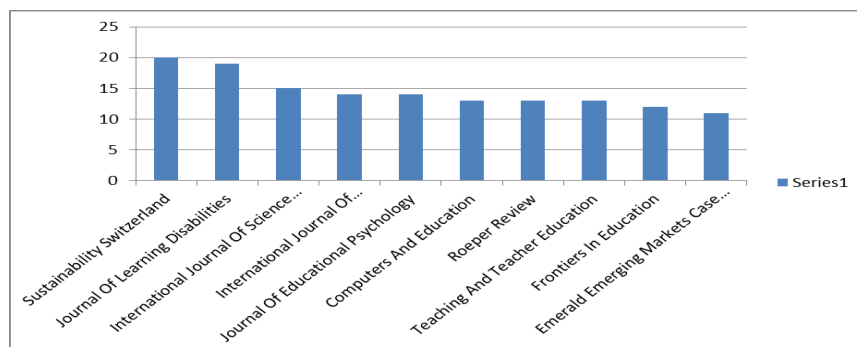


Figure 6. Documents by source

Three-Field Plot

The display in Figure 7 shows three important elements: author name, journal publication name, and the theme of differentiated learning employed. All these elements are connected by grey lines to show their relationship. Through the journal names, it is apparent which authors most frequently contribute to the publications, particularly those pertaining to the theme of differentiation and learning.

The size of each plot indicates the number of publications associated with the theme. According to the figure, there are 8 journals, with the Differentiated Classroom standing out as the one publishing the most research on differentiated learning. It is represented in dark red and is linked to various authors such as Struyven K, Gibbs K, De Jager t, and De Neve de.

The third component links each study topic to authors who have written extensively on the subject. 22 keywords related to differentiated instruction rank highest among the analysis findings. This demonstrates how closely the term is associated with differentiated learning studies.

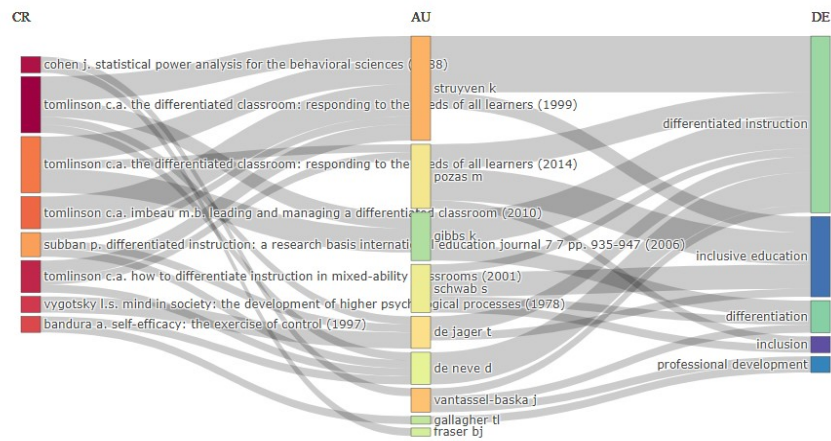


Figure 7. Three-Field Plot

Corresponding Author's Countries

Figure 8 shows that the USA has the most authors on the theme of differentiated learning, followed by Germany as the second rank. However, the difference between the first and second countries is enormous. The United Kingdom became the third country to become an author on the theme of differentiated learning. The most dominating authors about differentiated learning are from countries in the European continent, namely the UK, Germany, Spain and the Netherlands.

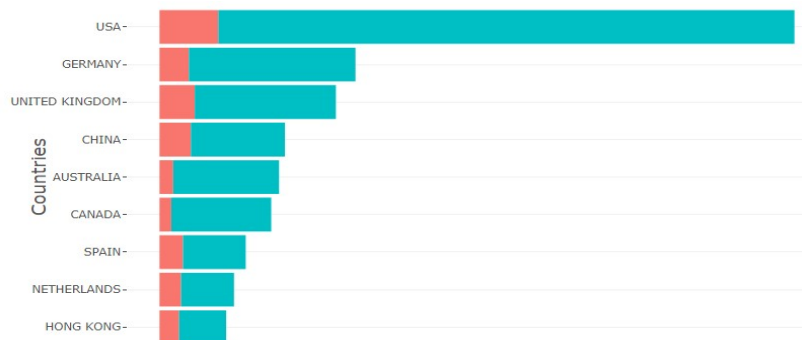


Figure 8. Corresponding Author's Countries

Most Global Cited Document

Table 2. Most Global Cited Document

Paper	Total Citations	TC per Year	Normalized TC
Schwartz Dl, 1998, Cogn Instr	741	28,50	5,93
Gelman Sa, 1986, Cognition	734	19,32	3,26
Cacioppo Jt, 1986, J Pers Soc Psychol	570	15,00	2,53
Davies Rs, 2013, Educ Technol Res Dev	557	50,64	17,55
Gorham J, 1988, Commun Educ	470	13,06	5,78
Scott Cm, 2000, J Speech Lang Hear Res	399	16,63	6,59
Gottfried Ae, 1985, J Educ Psychol	373	9,56	5,94
Valli L, 2007, Am Educ Res J	370	21,76	10,20
Genesee F, 1989, J Child Lang	346	9,89	2,17
Smith Jd, 1998, J Exp Psychol Learn Mem Cogn	325	12,50	2,60

Table 2 shows that the paper with the most extensive total citations is Schwartz DL with 741 Tc, Gelman Sa with 734 Tc, and Cacioppo Jt with 570 Tc. The three papers are also the papers that have the largest Tc per Year, which are 28.50, 19.32, and 15.00, respectively. The table shows that Total Citation affects TC per year, and when viewed from the year of publication, it has no influence on Total Citation.

Network Analysis

Figure 9 shows the incidence analysis of the research results on differentiated learning using minimum cluster size 1. Cluster 1 has 47 items, and "Teacher" is the dominating keyword. Cluster 2 has 33 items; Cluster 3 has 21 items; Cluster 4 has 13 items. With 190 total occurrences and a total link strength of 1787, they were dominating.

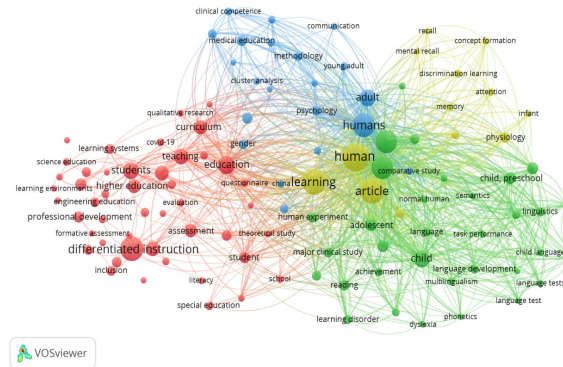


Figure 9. Network Analysis

Meanwhile, The overlay-based keyword network analysis is displayed in Figure 10 below. Differentiated keywords refer to terms that will be used in 2020. Simultaneously, the terms "human," "articles," "learning," and "child" have been around since the year 2000.

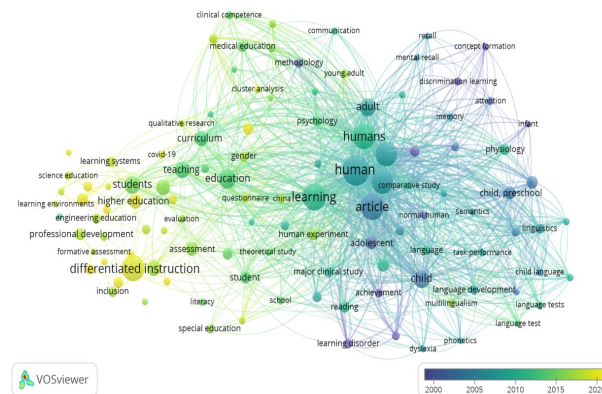


Figure 10. Keyword Network Analysis 1

Figure 11 shows that the keywords that have high density are human, article, learning, child, and differentiated instruction. In contrast, the keywords that still need to be researched are child language, language test, learning disorder, special education, and concept formation.

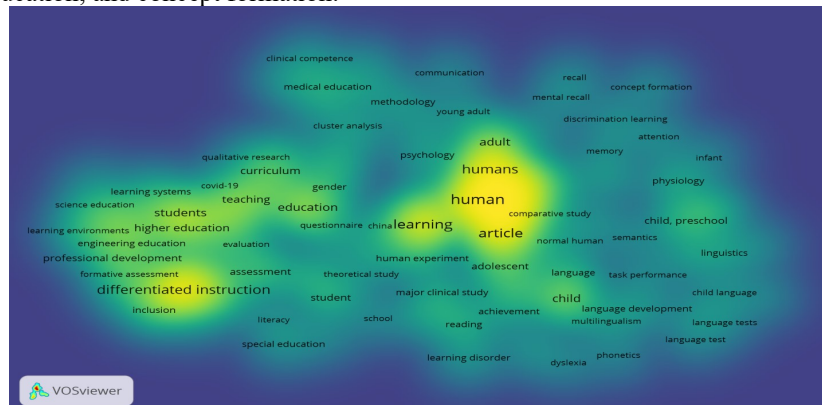


Figure 11. Keyword network analysis 2

Table 3 below shows the occurrence of each cluster representing the key themes in the differentiated learning research area; the theme in cluster one is School, and the theme in cluster two is communication. The theme in cluster three is country and character, and the theme in cluster four is personality.

Table 3. Occurrence in each cluster

Keyword	Occurrences	Cluster
1. Curriculum	48	1
2. Differentiated Learning	17	
3. Education	79	
4. Knowledge	16	
5. Students	68	
1. Language	20	2
2. Vocabulary	12	
3. Reading	28	
4. Child	68	
5. Controlled Study	34	
1. Humans	132	3
2. Gender	22	
3. Adult	64	
4. United States	15	
5. China	15	
1. Physiology	25	4
2. Learning	149	
3. Cognition	20	
4. Article	145	
5. Human	190	

Conclusion

Differentiated learning is a learning process that involves three essential elements of students' learning styles: visual, auditory, and kinesthetic. By paying attention to students' learning styles, teachers can choose the suitable method according to the characteristics of students' learning styles so that students' learning needs can be optimized. If students' learning needs are adequately met, it can automatically positively impact student learning outcomes. Judging from the results of bibliometric analysis conducted by researchers, publications with differentiated learning peaked in 2022 with 177 documents. The most relevant authors are Struyven, K, and Vantassel, with eight publications each. The University Of Hong Kong is affiliated with the most publications with 22 documents. The country that published the most was the United States, with 580 documents, followed by Bendu Europe with four countries; the largest MCP was the United States. Schwartz DI, 1998, Cogn Instr is the document with the most significant citation of 741 TC. The limitation of this research is that it only searches Scopus-indexed datasets and only analyses documents with journal article types in English without considering other global indexations, languages, and document types other than articles.

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