

 Review Article

The Trends of Differentiated Instruction Research: Bibliometric Analysis Spanning 1961–2023

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Abstract

In educational research, differentiated instruction, or DI, is a popular subject. Staying up to date with its most recent advancements and frontiers open up new research avenues. This article analyzes developments and trends in differentiated learning using bibliometric analysis between 1961 and 2023. This research focuses on publications from 1961 to 2023, frequently cited keywords, authors who most frequently publish about DI, most frequently cited authors, journals that publish the most, countries that publish the most on DI topics. In the bibliometric analysis, a total of 842 articles were obtained, taken from the Scopus database. The findings indicated that : (1) 2021 marks the pinnacle of publication with 82 papers, (2) Differentiated Instruction, student, teacher, learning, e-learning have been the most popular search terms, (3) Davies et al. (2013), Valli and Buese (2007), Zhu Z (2016), Subban (2006), Reis et al (2011) these have been the papers that have been quoted the most, (4) Katrien Struyven, Marcela Pozas, Letzel, V author with the most number of publication, (5) International Journal of Inclusive Education, Teaching And Teacher Education, ASEE Annual Conference And Exposition Conference Proceedings are among the best journals, (6) Vrije Universiteit Brussel, Universiteit Gent, University of Virginia have been the leading universities, and (7) US, Belgium and Canada have been the leading nations in this sector. This paper is a valuable addition to the subject matter and gives a thorough summary, the scientific environment, and the subject's future directions.

Keywords: Bibliometric, Differentiated Instruction, Learning



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1. INTRODUCTION

Differentiated instruction according to Tomlinson (1999) is learning that is differentiated with different approaches given by teachers to students on the same material. This learning began in 1961 and continues to develop until now. Students are differentiated with different approaches so that students have other choices in learning and understanding the material. This differentiated learning expects teachers to be able to adapt to students' understanding of learning (Gardiner-Walsh & Dobbins, 2012).

At the beginning of the emergence of differentiated learning, Carol Ann Tomlinson first brought this learning to the school sector. Tomlinson advises teachers to make something different by differentiating students who have their own abilities in learning according to their learning styles, interests and background

knowledge to learn the material (Tomlinson & Mctighe, 2006) Around the 1990s to 2000s, the development of differentiated learning research focused on strategies and practices that could be used for differentiated learning by dividing students into several groups according to the students' abilities. Several researchers have also begun to analyze the effectiveness of differentiated learning to improve student learning outcomes. In the last few years, it has not only focused on learning strategies and exercises, but has developed to include equipment in differentiated learning (Tomlinson, 1987)

Differentiated learning is expected to improve the learning process, facilitate each student in learning, and improve students' cognitive outcomes by using students' abilities and needs in learning. By facilitating the diversity of each student, it can allow students to develop as desired (Taylor, 2017). However, despite its many benefits, differentiated learning can be a challenge and requires a lot of preparation. As a result, it is very principal to master the theory of differentiated learning so that this learning can be effective and efficient in the classroom (Hernandez et al., 2023).

1.1 Aim of the Study

In bibliometric studies, previous research has investigated differentiated learning. With the increasing number of research on differentiated learning in more than six decades. This research aims to analyze differentiated learning with bibliometric scanning to know the state and trends in differentiated learning investigate related to publications, frequently used keywords, most cited documents, most productive authors, most active journals, most productive institutions, most active country. By looking at research on differentiated instruction, the goal of the review to improve earlier research and literature on differentiated learning. This research is to examine research on differentiated learning. The research objectives are as follows:

RQ1. What is the distribution of publications according to 1993 – 2023?

RQ2. What keywords do writers usually use in differentiated learning?

RQ3. Which research documents are often cited by researchers?

RQ4. Who are the most cited authors in publications on differentiated learning research?

RQ5. What journals are most active in differentiated learning research?

RQ6. Which institution has contributed the most publications in the last 30 years?

RQ7. Which countries are most productive in publishing differentiated learning research?

RQ8. What topics are trending and relevant for differentiated learning for future research?

2. METHODS

2.1 Study Design

This comprehensive review seek to analyze trends in differentiated learning. In terms of scope, the researcher took differentiated learning journal literature from scientific literature from the Scopus database 1961 – 2023 which had been filtered. Within this bibliometric analysis, researchers used Preferred Reporting Items for Systematic and Meta-Analyses.(PRISMA) (Liberati et al., 2009). All stages of bibliometric analysis are presented using PRISMA which is presented in Figure 1.

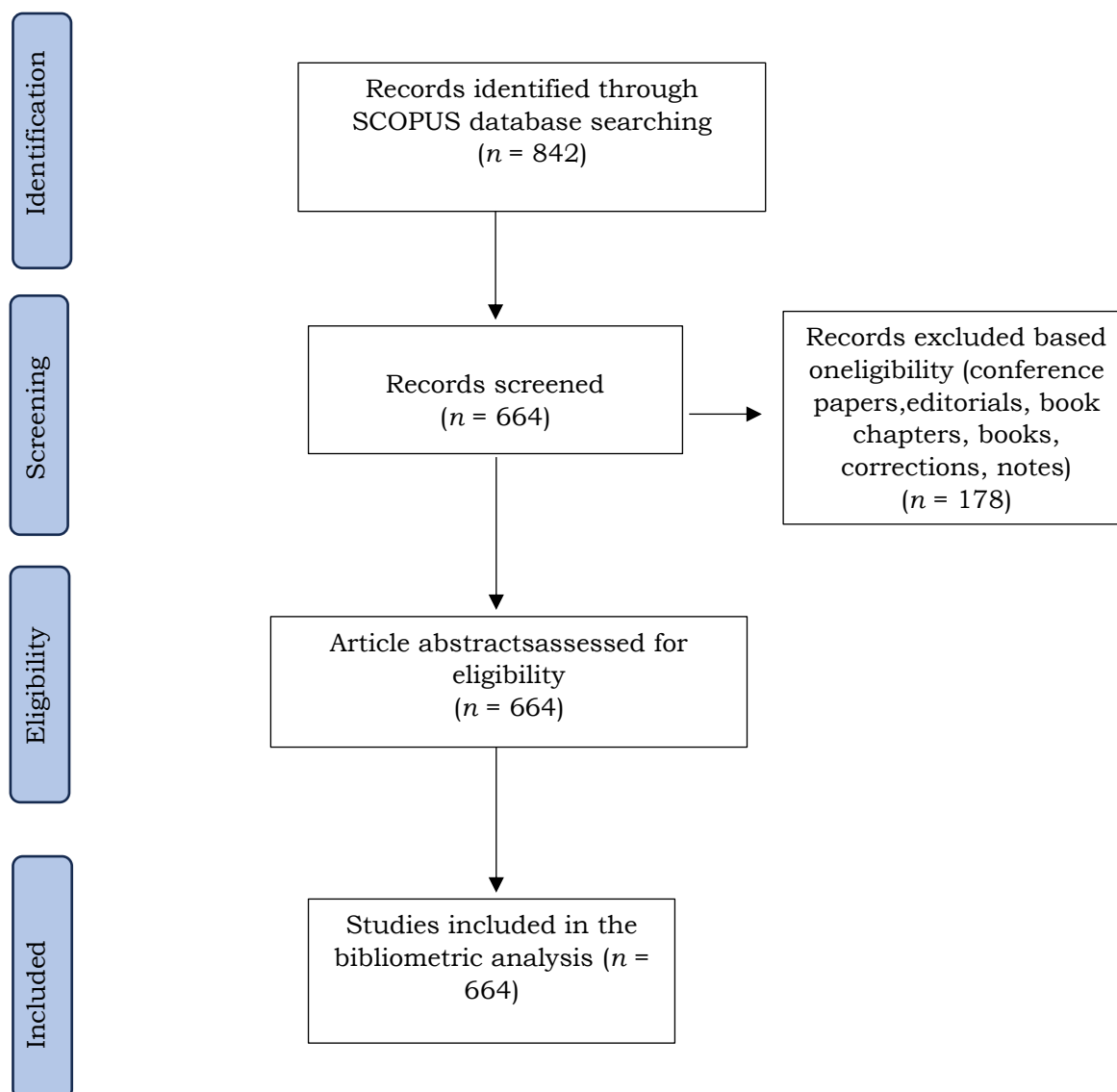


Figure 1. PRISMA Flow Diagram of the Present Study

2.2 Procedure

Documents taken in this research were sourced from the Scopus database (<https://www.scopus.com/>) on 05 October 2023. By utilizing the advanced inspection function with keywords combined with OR and AND. The command is as follows: TITLE – ABS – KEY “Differentiated Instruction”. The criteria for articles taken include keywords in the title, abstract or keywords. Then the variables selected are publication, year of publication, keywords used, documents cited, authors cited, active journals, productive journals, productive institutions, and productive countries. Then we describe the development of this research using quantitative methods.

In the bibliometric analysis obtained, it was from the initial year of publication, 1961 to 2023. In the research taken, it was from the initial publication until 2023. In the initial search, the total number of papers obtained was 842. In the results of this review several types of documents were taken including documents, conference papers and books). After we carried out Scopus filtering to separate 178 documents that were not included in articles, conference books and letters. After

frequently used in this topic are Differentiated Instruction, student, teacher, learning, e-learning. The number of citations in Figure 2 falls within the scope of the research examined.

3.2 Collaboration Network of Authors

In this section we also analyze collaboration between authors. The minimum number of documents selected is 3 and the minimum number of author quotations selected is 10.



Figure 3. Collaboration Network of Authors

In Figure 3, which has been visualized, there are 7 clusters, each of which has its own distinctive color. The cluster size is the same, the 3 authors are Tahiri J.S with Bennani S, Idris, then Stollman S with Merink J and Weste, then Megalbeh with Abdullah, the other 4 are not tied to anyone including Gibbs K, Marshall J, Wan S W, and Dack H. From the results of this visualization it can be said that Differentiated Instruction research is not strong enough. This is proven by the fact that this research is still on a small scale because there are only 3 clusters in the research.

3.3 Evolution of Publication and Citation

According to Figure 4, the number of articles related to differentiated learning topic continues to increase continuously over time, with the highest significant peak in 2013 with a total of 945 citations (22.72%).

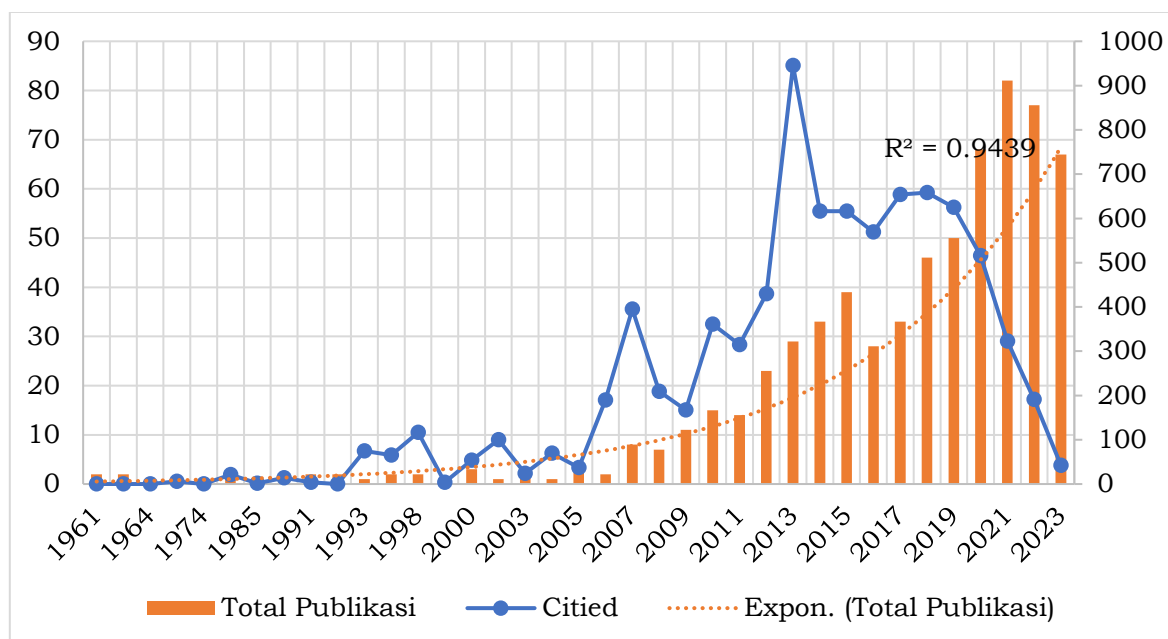


Figure 4. Evolution of Publication and Citation (1961 – 2023)

This analysis shows that there was an increase in that year. But in 2014 the total of 616 citations decreased slowly until 2023. The peak of publications will be in 2021 with a total publication of 82 articles. From this data, it can also be seen that the growth trend in differentiated learning research is getting a positive response, which can be seen from the determination value (R^2) which is 0.94, which means that the exponent value is reliable. This shows that differentiated learning research will continue and be relevant for research in the future.

3.4 Most Cited Documents

Table 1 display data about writers and the most citations ever monitored with Scopus. The top ten articles that have been cited, sourced from a variety of writers and sources, are listed in Table 1.

Table 1. Top 10 Most Cited Documents

Authors	Title	Source	Cites	Cited Per Year
Davies et al. (2013)	Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course	Educational Technology Research and Development	568	22.72
Valli & Buese (2007)	The changing roles of teachers in an era of high-stakes accountability	American Educational Research Journal	374	14.96
Zhu et al. (2016)	A research framework of smart education	Smart Learning Environments	320	12.8
Subban (2006)	Differentiated instruction: A research basis	International Education Journal	154	6.16

Authors	Title	Source	Cites	Cited Per Year
Reis et al. (2011)	The effects of differentiated instruction and enrichment pedagogy on reading achievement in five elementary schools	American Educational Research Journal	152	6.08
Boelens et al. (2018)	The design of blended learning in response to student diversity in higher education: Instructors' views and use of differentiated instruction in blended learning	Computers and Education	135	5.4
Dixon et al. (2014)	Differentiated instruction, professional development, and teacher efficacy	Journal for the Education of the Gifted	130	5.2
Taylor (2017)	Teachers and their implementation of differentiated instruction in the classroom	Teaching and Teacher Education	115	4.6
Vaughn et al. (1998)	Broken promises: Reading instruction in the resource room	Exceptional Children	111	4.44
De Neve et al. (2015)	The importance of job resources and self-efficacy for beginning teachers' professional learning in differentiated instruction	Teaching and Teacher Education	108	4.32

Table 1 display data about writers and the most citations ever monitored with Scopus. According to the data table in the paper written by Davies et al. (2013) got the most highest score with a total of 568 citations on the topic of differentiated learning. Then the next quotations are by Valli and Buese (2007) as many as 374, Zhu Z (2016) as many as 320, Subban (2006) as many as 154, Reis et al (2011) as many as 152. The following are the 5 most cited papers on the topic of differentiated learning. The factuality that Davies et al Al. (2013) who has been mentioned the most demonstrating that the field of individualized education has greatly benefited from his differentiated teaching. It should be mentioned, nonetheless, that significant amount of citations may mean that this may not always reflect the caliber of the research because there are other variables at play, such the popularity of the issue or the accessibility of the research. Other writers' work has clearly made a substantial contribution to the field of human resource management if it is on the list of the most referenced publications in the discipline. Including writers from other nations, such China (Zhu et al., 2016) and the United States (Dixon et al., 2014), further emphasizes the significance of different products. Research on education as a field. In general the information shown in table 2 offers helpful data for scholars looking into different teaching, because it can assist them in locating important writers and publications in the area furthermore, it can offer insight into the impact of research on the area and potential avenues for future study.

3.5 Number of Publications

Table 2 shows that Katrien Struyven from Vrije Universiteit Brussel in Belgium is the author who has published the most with 13 articles about differentiated learning. Marcela Pozas from the Universidad de Monterrey in Mexico ranked second with 10 articles. Table 2 also shows the authors with the h-index value which is used to measure the productivity of researchers who publish their work in the Scopus database. In Table 2 it can be seen that the highest h-index values are Marshall (h-

index = 110), Struyven (h-index = 29), Vanderlinde (h-index = 25). From the data above, it can be seen that Belgium has made a significant contribution in terms of writing articles about differentiated learning.

Table 2. The 10 Most Productive Authors

Author	Institution	Country	N	H-index
Struyven, K.	Universiteit Hasselt	Belgium	13	29
Pozas, M	Universidad de Monterrey	Mexico	10	7
Letzel, V	Universität Trier	Germany	8	7
Vantieghe, W.	Universiteit Gent	Belgium	6	10
Vanderlinde, R	Universiteit Gent	Belgium	6	25
Marshall, J	University of Toronto	Canada	6	110
Gheysens, E	Vrije Universiteit Brussel	Belgium	6	5
Wan, S.W.Y.	Chinese University of Hong Kong	Hong Kong	5	8
Valiandes, S.	University of Nicosia	Cyprus	5	3
Shareefa, M	Islamic University of Maldives	Maldives	5	5

3.6 Most Active Sources

Table 3 shows the journals and publication sources most frequently having to do with diversified learning. From this table, the journal “International Journal of Inclusive Education” is the publication that produces the most with 15 articles. Followed by the journal “Teaching And Teacher Education” with a total of 13 articles.

Table 3. Top 10 Most Active Sources

Journal	N	H-index	Q	SJR 2022	Publisher
International Journal of Inclusive Education	15	59	Q1	0.825	Routledge
Teaching And Teacher Education	13	145	Q1	1.62	Elsevier Ltd.
ASEE Annual Conference And Exposition Conference Proceedings	12	26	-	-	-
Journal Of Advanced Academics	11	36	Q3	0.36	SAGE Publications Ltd
International Journal Of Instruction	9	32	Q2	0.61	Gate Association for Teaching and Education
Cogent Education	9	28	Q2	0.44	Taylor and Francis Ltd.
Journal For The Education Of The Gifted	8	41	Q2	0.46	SAGE Publications Ltd
Teachers And Teaching Theory And Practice	7	69	Q1	1.17	Taylor and Francis Ltd.
Kappa Delta Pi Record	7	10	Q3	0.27	Taylor and Francis Ltd.
Soviet Education	6	9	Q4	0.1	M.E. Sharpe Inc.

Apart from that, Table 3 provides derived from the table telling us find that more citations there are the higher the for a journal or source, the higher the h-index value with the highest h-index number being “Teachers And Teaching Education” (145), “Teachers And Teaching Theory And Practice” (69), and “International Journal Of Inclusive Education” (59). When the SJR ranking is displayed, “Teachers And Teaching Education” gets the highest score (1.62), “Teachers And Teaching Theory And Practice” (1.17), and “International Journal Of Inclusive Education” (0.82) on

this indicator (h-index and SJR) shows that highly cited journals or sources have a significant influence in the field of teaching differentiation and are commonly acknowledged by experts in the field of distinct teaching. In Table 3 the Scopus index is used to rank from Q1 (most impact) to Q4 (least impact).

3.7 Most Prolific Institutions

In Table 4, there are universities that frequently publish on differentiated learning topics. From the data above, Vrije Universiteit Brussel from Belgium published 19 articles. Followed by Universiteit Gent which comes from Belgium also with 14 articles. And the University of Virginia from the United States with 11 articles. Research and scholars can use this data to better comprehend the most recent advancements different fields of teaching and locate collaborators or research partners at pertinent universities. Furthermore, this data offers insight into the global research and thought processes related to differentiated education. The most prolific authors in discipline can help scholars choose the best paths for their investigation to enrich knowledge in different areas of teaching.

Table 4. Top 10 Most Prolific Institutions

Institution	Country	Types	Documents
Vrije Universiteit Brussel	Belgium	Public	19
Universiteit Gent	Belgium	Public	14
University of Virginia	US	Public	11
Universität Trier	Germany	Public	10
Nanyang Technological University	Singapore	Public	9
National Institute of Education	Singapore	Public	9
Universiteit Hasselt	Belgium	Public	8
University of Connecticut	US	Public	8
Brock University	Canada	Public	7
The University of North Carolina at Charlotte	US	Public	7

3.8 Most Prolific Countries

Table 5 shows which countries are most productive in publishing articles on differentiated instruction topics. Data make know that the United States has the majority, with 225 articles or 27% of the total number of articles available. Followed by Belgium with 33 articles, followed by Canada with 29 articles, Australia with 27 articles, and South Africa with 21 articles as the top 5 countries that publish the most articles on this topic. This shows that America is in a very strong position in differentiated learning research in contrast to the other nations indicated in Table 4.

Table 5. Top 10 Most Prolific Countries

Country	N of paper	%
United States	225	27%
Belgium	33	4%
Canada	29	3%
Australia	27	3%
South Africa	21	2%
Netherlands	21	2%
Germany	21	2%
China	20	2%
Malaysia	17	2%
Turkey	16	2%

Numerous factors, including the quantity of universities and research facilities, the availability of financing for research, and the country's early adoption of differentiated learning, may have an impact on the US's ranking as the most productive nation.

4. DISCUSSION

In this study we used the Scopus database to look at the development of differentiated learning research from its inception until now (1961 – 2023). This bibliometric research analyzes this article by looking at previous bibliometric analysis. From the results obtained, 842 documents were collected and then selected again, namely articles, conference papers and books. The results obtained were 664 documents obtained. At the beginning of the emergence of research on differentiated learning which was popularized by Carol Tomlinson, only 2 appeared in 1961. Meanwhile, 2021 is the peak of differentiated learning publications, while the number of citations peaked in 2013 and decreased from 2014 to 2016 and then increased again. in 2017 which marks developments in differentiated learning research

From the bibliometric results, the word used to search for research on differentiated learning, the word that is often used is "Differentiated Instruction". This is a word that often appears in differentiated learning research and this word is also often carried out in previous research (Dal & Abu, 2023). The database taken is from Scopus. When using these keywords, the articles obtained are 884, then filtered again, the articles obtained are 664. Then in the findings in the field, the next keywords obtained are mostly about learning, education, the way teachers give lessons, student. From these frequently used words, it can be concluded that differentiated instruction research is still within the scope of schools or student learning.

Then in the next findings, researchers who are often quoted are Davies R.S.; Dean D. L.; Ball N 568 citations (Davies et al., 2013). Then Valli L.; Buese D 374 citations (Valli & Buese, 2007). and Zhu Z.-T.; Yu M.-H.; Riezebos P 320 quotes (Zhu et al., 2016) . He is a frequently quoted author. Therefore, the more quotes about differentiated learning, the greater the effect on the research. Then, in the highest publication findings, most of these researchers are from Belgium, Mexico and Germany, which are the top 3 researchers who frequently publish on differentiated learning research. Most researchers come from Europe and America, showing that researchers from these two continents have a more comprehensive understanding in the field

In further findings, namely the International Journal of Inclusive Education and Teaching And Teacher Education" are journals that often publish documents about differentiated instruction. This is in line with several bibliometric reviews regarding DI research. This also indicates that research on differentiated instruction usually appears in the field of education, which can be proven by journals. which usually publishes articles about DI. In further findings regarding the universities Vrije Universiteit Brussel (Belgium), Universiteit Gent (Belgium), University of Virginia (United States) from these results, most of the universities are in the top ranking. The countries that have contributed the most to DI research can be It can be seen that the United States, Belgium and Canada are the ones with the most research on differentiated instruction research. This is not surprising because these countries have quite large funds for research and development (Muh. Asriadi et al., 2023).

Differentiated Instruction research is one of the studies that has become a favorite topic for researchers in recent years. DI is a style of approach that looks at differences in student learning styles, student interests and student abilities (Wu, 2017). One of the aims of this differentiated instruction research is to create an atmosphere that is liked by each student in learning and can develop potential in learning in the classroom (Brigandi et al., 2019), in this learning style educators must be able to accommodate various resources, appropriate learning styles, and sources of student needs in receiving learning (Uysal & Dogan, 2021). One example can be taken of a teacher presenting reading material or additional media for students to understand material. This style of approach looks more at the importance of teachers being able to understand the differences between one student and another (Sharkey, 2003). Therefore, it is important for this research in the future because students will get used to their own learning styles or in the future students can combine their learning styles with learning styles that they have never experienced in class.

5. CONCLUSION AND LIMITATIONS

In conclusion, this research concerns bibliometrics in Differentiated Instruction research from 1961 to 2023. The documents obtained were 842 documents which were obtained and then filtered again according to the researcher's wishes, namely 664 articles. From 1961 to 2023, the highest citation was obtained in 2013 with 945 citations and 2021 was the highest publication with 82 publications. The database search on Scopus used was "Differentiated Instruction". Frequently cited authors are Davies et al. (2013) 568, Valli and Buese (2007) as many as 374. Then among the authors who publish frequently, there are Struyven with 29 publications, Pozas M and Letzel with 7 publications. Then the universities that have contributed the most to this topic are the universities Vrije Universiteit Brussel (Belgium), Universiteit Gent (Belgium), University of Virginia (United States). Then the journals that frequently publish on the topic of differentiated learning are "International Journal of Inclusive Education" and Teaching and Teacher Education". And the countries that contribute the most to this topic are the United States, Belgium and Canada.

There are several limitations to this research, namely the database taken only from Scopus data, whereas it could be from other databases such as Web of Science. The database that we filter only includes documents, books and conference proceedings. In future research, it is recommended to take other documents so that more data can be obtained. In this study, what is meant by differentiation is still broadly not specific. Further research can be taken at high school or university level.

Conflict of Interest

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