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Mapping Global Research Trends on Differentiated Instruction: A Bibliometric Analysis of Two Decades of Scholarship

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ABSTRACT

Objective: This study aims to map the evolution, influence, and thematic structure of global research on Differentiated Instruction (DI) published between 2005 and 2025. It examines the field's developmental trajectory, key contributors, and emerging research directions that reflect the growing emphasis on inclusive and adaptive education. **Methods:** A bibliometric approach was conducted using 743 documents indexed in the Web of Science Core Collection. Analyses were performed with RStudio and VOSviewer to assess publication growth, citation patterns, co-authorship networks, and keyword co-occurrences. The study also identified thematic clusters and trend topics to trace the conceptual and methodological development of DI scholarship over two decades. **Results:** The findings indicate an annual growth rate of 11.77%, demonstrating that DI has developed into a dynamic and interdisciplinary research domain. The United States, Germany, and China emerged as the most influential contributors, while *Teaching and Teacher Education* and the *International Journal of Inclusive Education* were identified as leading journals. Four dominant research clusters were revealed: inclusive education, teacher professional development, technology integration, and student achievement. **Novelty:** This study provides the first comprehensive bibliometric mapping of DI research spanning 20 years, highlighting the shift from traditional differentiation toward digitally adaptive and equity-oriented pedagogies. The findings offer an evidence-based overview that supports the advancement of 21st-century inclusive teaching.

INTRODUCTION

The demands of 21st century education require learning systems that are responsive to student diversity and oriented toward equity and inclusion. Global frameworks emphasise that high quality education for all must remove pedagogical barriers and adapt to learners' varied profiles, an agenda that positions differentiated instruction (DI) as a practical pathway to inclusive schooling ((UNESCO, 2021). Conceptually, DI is a proactive design stance in which teachers adjust content, process, and product to learners' readiness, interests, and profiles, thereby challenging the one size fits all paradigm and inviting flexible, learner centred environments (Aminuriyah et al., 2023; Kara & Tekindur, 2025; Sapan & Mede, 2022; Subban, 2006; Tomlinson, 2014)

Over the past two decades, research on DI has expanded rapidly and matured methodologically. Recent bibliometric maps show sustained growth, diversified author networks and a consolidation of core outlets (AM, 2023; Utami et al., 2024). These studies also locate the United States and parts of Europe and Asia among prolific contributors, while surfacing under representation from developing contexts (Utami et al., 2024)

Alongside this quantitative growth, the focus of DI scholarship is shifting. Newer work emphasises instructional design, technology enhanced DI and teacher professional development as leverage points for scalable implementation, from curated, standards aligned resources to pre service teachers' digital artefacts supporting DI in STEM (Estaiteyeh & Decoito, 2024; Grecu, 2023). Meta analytic evidence indicates that PD in DI yields medium effects on teacher knowledge, attitudes and practice, although impacts on

student outcomes remain mixed, which underscores the need for sustained and practice proximal support (Kahmann et al., 2022; Smets & Struyven, 2020)

At the same time, digital transformation raises new questions about operationalising DI across online and hybrid settings, adaptive assessment and cross cultural contexts. Large scale reviews of digital learning underscore the role of AI, adaptive systems and platforms in enabling personalisation, yet also warn about equity, infrastructure and teacher capacity(Yaseen et al., 2025; Zou et al., 2025). Emerging work on adaptive teaching and assessment links diagnostic responsiveness in classroom discourse to long term learning and demonstrates how DI and UDL principles can be embedded within LMS based adaptive pathways (Hardy et al., 2022; Machkour et al., 2025). Cross cultural studies further show how teachers' beliefs, class size and grouping practices shape DI enactment ((Bi et al., 2023)

Consequently, a comprehensive bibliometric synthesis is timely. Prior studies map outputs and key contributors, but few trace how thematic and theoretical orientations of DI evolve alongside digitally mediated and cross cultural implementations. This study therefore asks:

1. RQ1: How has global DI production from 2005 to 2025 evolved in publication trends, authorship and collaboration?
2. RQ2: Which authors, journals and documents have most shaped the field's intellectual and conceptual structure?
3. RQ3: What major themes, keyword clusters and emerging trends define current and near future DI directions?
4. RQ4: How do thematic structures and trend analyses reflect DI's theoretical and practical evolution, including digital and cross cultural dimensions?

By addressing these questions, the study offers an integrated evidence base to guide research, policy and classroom innovation toward more inclusive and adaptive pedagogies worldwide (AM, 2023; Hu, 2024; Utami et al., 2024)).

RESEARCH METHOD

Bibliographic data were retrieved from the Web of Science Core Collection in June 2025 for publications spanning 2005 to 2025. The search was performed in the Topic field, which indexes titles, abstracts, author keywords, and Keywords Plus, using the following query:

TS = *("differentiated instruction" OR "differentiated learning" OR "differentiated teaching" OR "instructional differentiation").*

Only English-language journal articles and review papers were included, while conference proceedings, book chapters, editorials, and meeting abstracts were excluded. The retrieved documents were limited to the categories *Education, Education Educational Research, Education Scientific Disciplines, Education Special,* And *Psychology Educational* to ensure disciplinary precision. The suitability of the Web of Science database for bibliometric analysis is supported by prior comparative evaluations of coverage and retrieval accuracy (Gusenbauer & Gauster, 2025; Mongeon & Paul-Hus, 2016)

All eligible records were exported in plain-text format containing complete bibliographic metadata (authors, titles, abstracts, keywords, publication years, sources,

affiliations, and cited references). Data cleaning and normalisation involved the removal of duplicate entries, standardisation of author and institutional names, and the merging of synonymous keywords such as *differentiated instruction* and *instructional differentiation*, following best practices in science-mapping methodology (Aria & Cuccurullo, 2017; Boyack & Klavans, 2010; Moral-Muñoz et al., 2020)

Analytical processing was conducted in RStudio using the *bibliometrix* and *Biblioshiny* packages for descriptive and performance analyses, including publication trends, author productivity, citation metrics, leading journals, thematic mapping, and trend evolution. Network construction and visualisation were executed in VOSviewer to examine coauthorship, cocitation, and keyword cooccurrence patterns that reveal intellectual foundations and collaborative structures (van Eck & Waltman, 2010). Analytical thresholds were established at a minimum of five keyword occurrences and five reference citations to maintain cluster stability. Fractional- and full-counting principles were applied following established bibliometric network standards (Perianes-Rodriguez et al., 2016). Trend detection and temporal visualisation were supported by R Studio (Yanti et al., 2025)

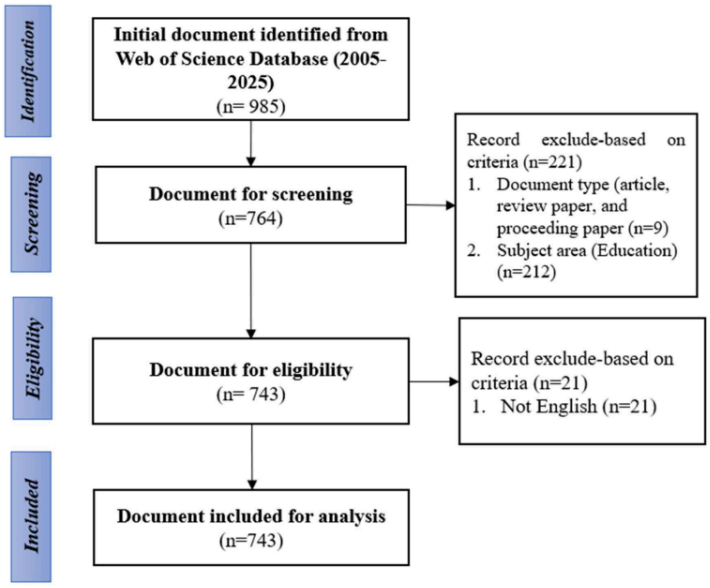

Figure 1. PRISMA flow diagram of the bibliometric document selection process

The figure illustrates the four stages of the PRISMA 2020 process: identification, screening, eligibility, and inclusion. From 985 initial records retrieved from the Web of Science Core Collection (2005–2025), 221 were excluded due to mismatched categories or document types, and 21 were excluded for being non-English. A total

of 743 records satisfied the eligibility criteria and were included in the bibliometric dataset, representing the final corpus analysed in this study.

RESULTS AND DISCUSSION

Results

The results of this bibliometric analysis present an overview of publication activity and research patterns in Differentiated Instruction from 2005 to 2025 based on data retrieved from the Web of Science Core Collection. The analysis describes publication growth, authorship characteristics, collaboration structures, and thematic developments that define the field's evolution. Indicators related to annual scientific production, leading authors, influential journals, and frequently occurring keywords are reported to illustrate the scope and distribution of research output. The following subsections detail the publication structure, scientific production trends, international collaboration patterns, and thematic progression observed in the dataset.

Publication Structure

The bibliometric analysis of Differentiated Instruction research from 2005 to 2025 identified 743 documents published across 380 sources. A total of 1,655 authors contributed to these publications, including 146 single-authored papers. The average number of co-authors per document was 2.68, and 13.2 percent of the publications involved international collaboration. The dataset included 2,124 author keywords and 26,715 references. The average document age was 5.58 years, and the mean citation rate was 11.57 citations per publication. These quantitative indicators describe the publication volume, authorship patterns, collaboration levels, and citation distribution within the Differentiated Instruction research corpus.

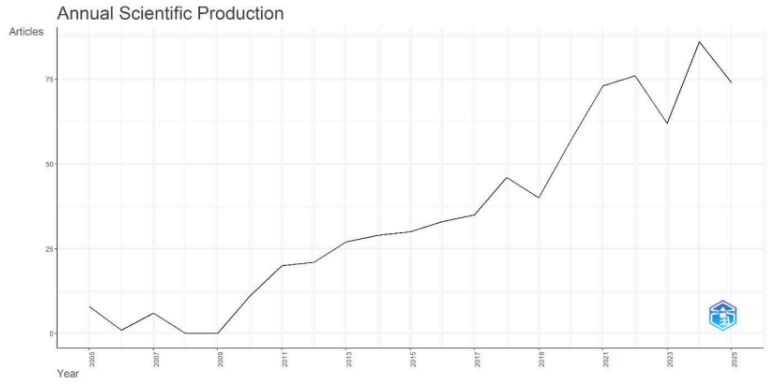

Figure 2. Annual Growth of Publications on Differentiated Instruction (DI) research

Figure 2 presents the annual scientific production of Differentiated Instruction research from 2005 to 2025. Publication counts remained low and irregular between 2005 and 2010. A gradual increase is visible beginning in 2011, followed by consistent growth through 2018. A marked rise in output is observed between 2019 and 2023, during which annual publications exceeded 75 documents. A slight decrease appears after 2023. Overall, the figure displays year-to-year fluctuations and long-term growth patterns within the dataset.

Tree Map

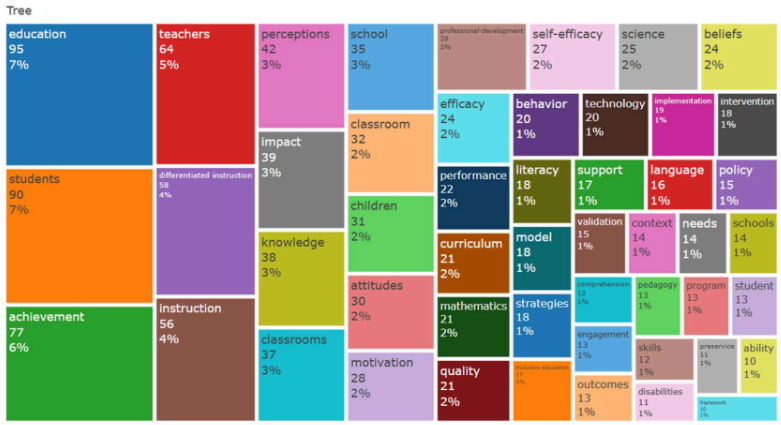

Figure 3. Tree Map

Figure 3 presents the distribution of author keywords in Differentiated Instruction research. The most frequently occurring terms include education, students, achievement, teachers, differentiated instruction, and instruction. Additional recurring keywords such as perceptions, self efficacy, motivation, professional development, and impact appear alongside terms related to curriculum, technology, language, and literacy. The treemap displays the relative frequency of these terms, showing the range and concentration of topics represented across the publications.

Country collaboration

The coauthorship network map displays collaboration patterns among countries contributing to Differentiated Instruction research. The United States, England, and the Netherlands appear as prominent nodes with multiple connections to other countries in the network. Additional countries such as Italy, Sweden, France, Finland, and Australia show visible linkages within the European and Anglophone clusters. The map also includes Poland, Turkey, India, Indonesia, Malaysia, and several other regions,

indicating participation from a range of geographical areas. The network illustrates the distribution and connectivity of international coauthorship within the dataset.

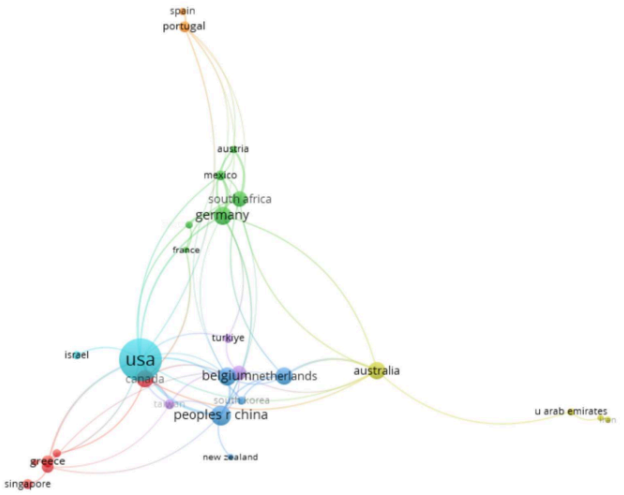

Figure 4. International Collaboration Network on Differentiated Instruction (DI) Research

Figure 4 shows the global collaboration network in Differentiated Instruction research and the connections among the most productive countries. The United States records the highest number of publications with 223 documents, 3384 citations, and a total link strength of 25. Germany and China follow with relatively high publication counts and link strengths. Australia, Canada, and South Africa also appear with multiple collaborative links in the network. Several European countries, including Belgium, the Netherlands, Austria, and Switzerland, display participation in cross national coauthorship patterns. Other contributing countries such as Indonesia, Taiwan, and Portugal are also present in the network. The table provides supporting quantitative information on the number of documents, citations, and link strengths for each country included in the collaboration map.

Table 1. State Productivity

Rank	Country	Documents	Citations	Total Link Strength
1	USA	223	3,384	25.00
2	Germany	41	398	19.00
3	People's R China	51	538	16.00
4	Australia	39	388	9.00
5	Canada	36	582	9.00

Rank	Country	Documents	Citations	Total Link Strength
6	Mexico	12	102	9.00
7	South Africa	29	282	9.00
8	Netherlands	38	816	8.00
9	Belgium	41	1,074	7.00
10	England	17	69	7.00
11	Austria	7	139	6.00
12	Switzerland	7	140	6.00
13	Indonesia	25	180	5.00
14	Taiwan	13	78	5.00
15	Portugal	15	121	4.00
16	South Korea	8	93	4.00
17	France	6	16	3.00
18	Türkiye	10	13	3.00
19	Cyprus	8	97	2.00
20	India	5	24	2.00

The most influental Journal

Table 2 presents the publication sources with the highest productivity and citation counts in Differentiated Instruction research from 2005 to 2025. Teaching and Teacher Education records 25 publications, 804 citations, and a total link strength of 176. The International Journal of Inclusive Education follows with 19 documents and 458 citations. Other journals with notable publication and citation frequencies include Teachers and Teaching, Studies in Educational Evaluation, Frontiers in Education, and Cogent Education. Additional sources such as the Journal of Research in Special Educational Needs, the European Journal of Special Needs Education, Interactive Learning Environments, and Education and Information Technologies also appear in the dataset. The table provides numerical indicators of output, citation impact, and link strength for each journal included.

Table 2. The Most Influental Journal

Rank	Source	Documents	Citations	Total Link Strength
1	Teaching and Teacher Education	25	804	176
2	International Journal of Inclusive Education	19	458	107
3	Teachers and Teaching	9	243	71
4	Studies in Educational Evaluation	8	218	65
5	Frontiers in Education	15	92	59
6	Cogent Education	17	56	58
7	International Journal of Educational Research	9	149	55
8	Education Sciences	15	27	41
9	Journal of Research in Special Educational Needs	6	60	33
10	International Journal of Instruction	8	67	27
11	Theory Into Practice	5	214	27

Rank	Source	Documents	Citations	Total Link Strength
12	Learning and Instruction	5	114	24
13	Journal of Education for Teaching	5	37	20
14	South African Journal of Education	7	15	19
15	Journal of Advanced Academics	6	34	15
16	European Journal of Special Needs Education	5	55	14
17	Interactive Learning Environments	5	88	7
18	Education and Information Technologies	8	59	5
19	Differentiated Instruction Made Practical: Engaging the Diverse Classroom	10	7	3
20	International Journal of Emerging Technologies in Learning	5	16	3

The most of influental Authors

Table 3 presents the authors with the highest publication output, citation counts, and link strength in Differentiated Instruction research from 2005 to 2025. Ruben Vanderlinde appears with 9 publications, 144 citations, and a total link strength of 187. Katrien Struyven has 10 publications, 279 citations, and a link strength of 178. Other authors with notable document counts include Marcela Pozas, Wendelien Vantieghem, and Iris Roose. Additional contributors such as Piet Van Avermaet, Nadine Engels, and Karolien Keppens show citation totals and link strengths that place them among the frequently represented authors in the dataset. Authors including Verena Letzel, Verena Letzel Alt, Julia Griful Freixenet, Susanne Schwab, and Christoph Schneider also appear within the top ranked group. The table provides numerical values for publication counts, citation frequencies, and total link strengths for all listed authors.

Table 3. Most Influential Author

Rank	Author	Documents	Citations	Total Link Strength
1	Vanderlinde, Ruben	9	144	187
2	Struyven, Katrien	10	279	178
3	Pozas, Marcela	14	147	151
4	Vantieghem, Wendelien	7	161	150
5	Roose, Iris	5	84	127
6	Van Avermaet, Piet	5	84	127
7	Engels, Nadine	4	132	112
8	Keppens, Karolien	5	82	106
9	Letzel, Verena	8	100	102
10	Consuegra, Els	5	83	92
11	Gheysens, Esther	5	138	80
12	Letzel-Alt, Verena	6	47	69
13	Griful-Freixenet, Julia	4	137	64
14	Schwab, Susanne	6	129	59

Rank	Author	Documents	Citations	Total Link Strength
15	Schneider, Christoph	4	56	54
16	De Neve, Debbie	4	202	49
17	Visscher, Adrie J.	4	157	47
18	Cai, Juan	4	14	43
19	Van Geel, Marieke	5	158	43
20	Wan, Sally Wai-Yan	5	105	41

The most of influental Documents

Table 4 show the most influential publications shaping the Differentiated Instruction (DI) research landscape over the past two decades. The highest-cited work is by ((Davies, 2013) with 521 citations, emphasizing effective teaching practices through differentiation. Foundational studies such as (Valli, 2007) and (Tomlinson, 2014) highlight teacher beliefs and pedagogical frameworks that underpin DI implementation, while recent contributions by (Suprayogi, 2017); (De Neve, 2015), and (Boelens, 2018) expand the focus to empirical validation and technology-supported differentiation.

Table 4. Top 20 Most Cited Articles

Rank	Author (Year)	Article Title	Source (Journal Name)	Citations
1	(Smale-Jacobse et al., 2019)	The Relationship between Differentiated Teaching and Student Learning Gains	Frontiers in Education	653
2	(Davies, 2013)	Researching Differentiated Instruction: Strategies for Effective Teaching Practice	Teaching and Teacher Education	521
3	(Valli, 2007)	Linking Teacher Beliefs to Differentiated Classroom Practices	Journal of Education for Teaching	337
4	(Suprayogi, 2017)	Teachers' Beliefs and Practices of Differentiated Instruction in Indonesian Classrooms	International Journal of Instruction	149
5	(De Neve, 2015)	Improving Teaching through Differentiation: Evidence from Belgian Schools	Teaching and Teacher Education	125
6	(Boelens, 2018)	Designing Blended Learning Environments for Differentiated Instruction	Education and Information Technologies	135
7	(Deunk, 2018)	Differentiation in Primary Education: A Review of Teaching Practices and Outcomes	Studies in Educational Evaluation	123
8	(Reis, 2011)	Differentiated Instruction: A Framework for Inclusive Education	International Journal of Inclusive Education	128
9	(Smit, 2012)	Differentiating Instruction in Diverse Classrooms: Teacher Attitudes and Challenges	Cogent Education	117
10	(Pozas et al., 2023)	Teachers and differentiated instruction: exploringdifferentiation practices to address student diversity	Journal of Research in Special Educational Needs	416
11	(C & Connor, 2011)	Child Characteristics and Teacher Practices in Differentiated Reading Instruction	Learning and Instruction	70

Rank	Author (Year)	Article Title	Source (Journal Name)	Citations
12	(Carol McDonald Connor & Morrison, 2016)	Individualizing Student Instruction in Reading: Implications for Policy and Practice	Policy Insights from the Behavioral and Brain Sciences	64
13	(Coubregs, 2017)	Teachers' Perceptions and Implementation of Differentiated Learning	Studies in Educational Evaluation	71
14	(Vanderlinde, 2020)	Evaluating the Impact of Differentiated Instruction on Student Achievement	Educational Research and Evaluation	73
15	(Tomlinson, 2014)	The Differentiated Classroom: Responding to the Needs of All Learners	Educational Leadership	78
16	Brigham, F. (2011)	Differentiation and Inclusion in the 21st Century Classroom	Teaching Exceptional Children	86
17	(Bai, 2021)	Differentiated Instruction in Multilingual Classrooms: Challenges and Prospects	Asia-Pacific Education Researcher	94
18	(Saxena, 2020)	Technology Integration to Support Differentiated Learning in Hybrid Classrooms	Interactive Learning Environments	99
19	(Strawhacker et al., 2018)	Teaching tools, teachers' rules: exploring the impact of teaching styles on young children's programming knowledge in ScratchJr	International Journal of Technology and Design Education	90
20	(Datnow, 2020)	The role of teachers in educational reform: A 20-year perspective	J Educ Change	76

Most frequently discussed themes

Figure 5 shows the keyword co-occurrence network in *Differentiated Instruction (DI)* research, revealing the conceptual structure and main thematic clusters in the field. The map identifies several interconnected clusters that represent the most frequently discussed research themes.

Cluster 1 (Purple): Differentiated Instruction, Diversity, and Assessment

This dominant cluster centers on the core concept of *differentiated instruction* and its relationship with *diversity*, *learning outcomes*, *assessment*, and *equity*. It emphasizes the importance of tailoring instruction to meet diverse learner needs, assessing student progress, and promoting inclusive learning environments. Studies in this cluster often explore frameworks and classroom strategies that balance differentiation with fairness, motivation, and student achievement.

Cluster 2 (Orange): Inclusive Education and Professional Vision

The second cluster connects *inclusive education*, *professional vision*, *beginning teachers*, and *student diversity*, focusing on teachers' preparedness and professional competence in implementing inclusive practices. This cluster highlights the pedagogical shift toward inclusion as a foundation of differentiated learning and emphasizes the role of teacher education and policy in fostering equitable classrooms.

Cluster 3 (Blue): Professional Development and Teacher Self-Efficacy

This cluster groups terms such as *professional development*, *self-efficacy*, and *instructional differentiation*, underscoring the importance of teachers' confidence and continuous training in applying DI effectively. Research within this theme explores how targeted professional learning opportunities enhance instructional adaptability and classroom management in diverse educational contexts.

Cluster 4 (Green): Technology Integration and Collaborative Learning

The green cluster includes *technology*, *online learning*, *collaborative learning*, and *adaptive teaching*, representing the growing intersection between differentiated instruction and educational technology. Studies here investigate how digital tools, learning management systems, and online pedagogies can support personalized learning and facilitate collaboration among students in hybrid or digital settings.

Cluster 5 (Red): Pedagogy, Motivation, and Student Engagement

This cluster focuses on *pedagogy*, *teaching methods*, *motivation*, and *achievement*, examining how differentiated instruction enhances student engagement and intrinsic motivation. It links traditional pedagogical theories with contemporary approaches such as *active learning*, *STEM education*, and *formative assessment*, reflecting a broader effort to integrate differentiation into student-centered learning models.

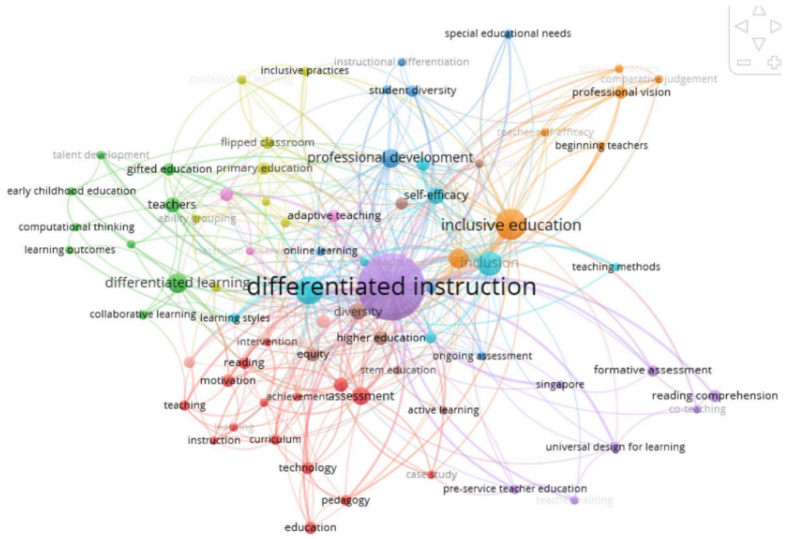

Figure 5. Research Themes in Differentiated Instruction (DI) research

Trending Topic

Research on differentiated instruction (DI) has progressed from an early focus on foundational classroom practices and student characteristics (growth, literacy instruction, risk, special education) in the period 2011–2015, toward an emphasis on teacher competence and pedagogical effectiveness (teachers, classroom, instruction, self-efficacy, academic achievement) between 2015 and 2020. From 2021 to 2025, emerging themes such as implementation, validation, and student achievement indicate a growing focus on evaluating DI outcomes and integrating evidence-based practices into broader educational reforms. Overall, these trends demonstrate a shift from examining basic classroom strategies to addressing more complex pedagogical and institutional dimensions that support inclusive and adaptive learning environments.

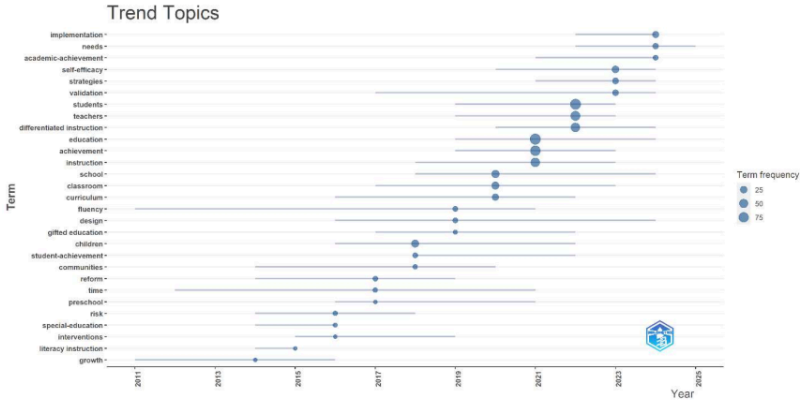

Figure 6. Trending Research Topics in Differentiated Instruction (DI) research

Figure 7 illustrates the thematic structure of Differentiated Instruction (DI) research by mapping the interaction between topic development (density) and relevance (centrality). The motor themes, namely instruction, children, and intervention, represent highly developed and influential areas, indicating the field's sustained focus on effective teaching strategies and evidence-based classroom practices. The basic themes, including education, students, and achievement, form the conceptual core of DI research and maintain strong relevance to learning outcomes and academic performance. Niche themes such as teacher education and universal design reflect specialized yet mature domains that emphasize teacher preparation and inclusive pedagogical frameworks. At the same time, emerging themes such as online learning and special education adaptations point to increasing attention toward digital, flexible, and adaptive instructional approaches. Collectively, these thematic patterns demonstrate that DI

research is progressing toward more integrated, technology supported, and inclusivity oriented instructional models.

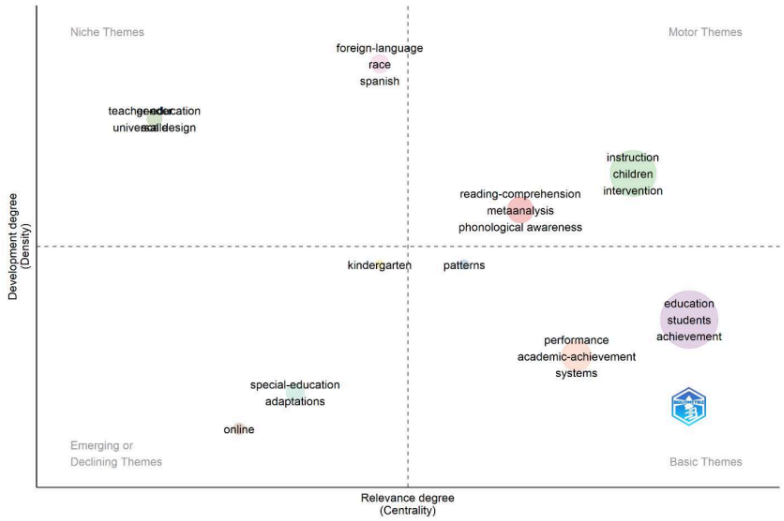

Figure 7. Thematic Map of Differentiated Instruction (DI) research

Discussion

The bibliometric findings demonstrate that research on Differentiated Instruction has expanded substantially over the past two decades, showing a clear progression from conceptual foundations to evidence based classroom applications. The continuous growth in publications, especially the notable increase after 2019, reflects the rising global interest in Differentiated Instruction as an instructional framework that supports inclusive and student centered learning environments (Reis, 2011; Sapan & Mede, 2022; Smale-Jacobse et al., 2019). This pattern aligns with broader educational reforms that emphasize equity, personalization, and responsiveness to diverse learning needs (Ardenlid et al., 2025; Dumont & Ready, 2023; Gibbs, 2025; Goyibova et al., 2025a; Gunawardena et al., 2024; Lee et al., 2022; Liang et al., 2025; McCoy et al., 2020; Reis, 2011; Tomlinson, 2014; Tong & Swaran Singh, 2024; Yang et al., 2025)

International collaboration patterns further reinforce the academic maturity of the field. Countries such as the United States, Germany, Belgium, China, and Australia function as central contributors whose work shapes global discourse on Differentiated Instruction (Smets & Struyven, 2020; Vanderlinde, 2020) The increasing involvement of Indonesia, Portugal, South Korea, and Taiwan illustrates that Differentiated Instruction is being interpreted and adapted in diverse sociocultural contexts (Suprayogi, 2017;

Yunaini et al., 2024) These developments suggest that Differentiated Instruction is now acknowledged as a flexible and culturally adaptable pedagogical model (Aminuriyah et al., 2023; Bai, 2021; Gündüz & Özcan, 2010; Kara & Tekindur, 2025; Karadag & Yasar, 2010; Little et al., 2014; Mirawati et al., 2022; Sapan & Mede, 2022; Smit, 2012; Tomlinson, 2005; Wiakta Putri & Mangunsong, 2024; Yang et al., 2025)

The prominence of journals such as Teaching and Teacher Education, the International Journal of Inclusive Education, and Studies in Educational Evaluation highlights the strong empirical basis supporting Differentiated Instruction. Research published in these outlets frequently addresses the impact of Differentiated Instruction on academic achievement, classroom engagement, and teacher professional competence (Davies, 2013; De Neve, 2015; Pozas & Letzel-Alt, 2023). Such work underscores the increasing emphasis on assessment supported instructional decision making and the integration of adaptive strategies into classroom practice (Carol McDonald Connor & Morrison, 2016; Deunk, 2018).

The contributions of leading authors including Vanderlinde, Struyven, Pozas, and Vantieghem further demonstrate the theoretical and empirical consolidation of the field. Their work consistently highlights the role of teacher preparation, self efficacy, and professional development as essential conditions for successful Differentiated Instruction implementation (Letzel et al, 2023; Meutstege et al., 2023). This shift toward practical and classroom based inquiry reflects a broader movement from conceptual advocacy to validated application supported by rigorous evidence (Boelens, 2018; Coubregs, 2017).

Keyword co occurrence patterns and thematic evolution reveal a multidimensional research landscape that incorporates inclusion, motivation, assessment, teacher development, and technology supported learning. The growth of themes related to online learning, collaborative learning, and adaptive instruction indicates an emerging focus on digital environments and technology supported differentiation (Estaiteyeh & Decoito, 2024; Saxena, 2020; Strawhacker et al., 2018). Recent studies show that digital tools and flexible learning platforms enhance opportunities for personalized learning pathways (Achmad et al., 2024; Gibbs, 2023; Hu, 2024)

The trend topic analysis shows a clear chronological progression. Early research between 2011 and 2015 centered on student characteristics, foundational instructional strategies, and special education (Reis, 2011, Brigham, 2011). Research between 2015 and 2020 emphasized teacher competence, instructional effectiveness, and professional capacity (De Neve, 2015; Suprayogi, 2017; Valli, 2007). Studies published after 2021 increasingly explore implementation fidelity, validation frameworks, and measurable learning outcomes (Bai, 2021; Meutstege et al., 2023; Pozas & Letzel-Alt, 2023) This shift signals a transition toward applied and outcome based Differentiated Instruction supported by data driven instructional design (Estaiteyeh & Decoito, 2024; Muh. Asriadi et al., 2023).

The thematic map confirms the structural maturity of the field. Established motor themes such as instruction, children, and intervention represent the core of Differentiated Instruction research (Davies, 2013; Smale-Jacobse et al., 2019). Basic themes including

education, students, and achievement continue to anchor the field in student outcomes and learning performance (Carol McDonald Connor & Morrison, 2016; Deunk, 2018). Emerging themes such as online learning and adaptations for special education point toward new directions that integrate inclusive technologies and flexible instructional models (Yunaini et al., 2024) Niche themes including teacher education and universal design reinforce the importance of systematic teacher preparation and inclusive curriculum frameworks (Gheyssens et al., 2023; Letzel et al, 2023).

Overall, the discussion illustrates that research on Differentiated Instruction has moved from conceptual exploration to systematic and technology supported instructional innovation. Findings across recent studies consistently support Differentiated Instruction as a central component of contemporary inclusive education, emphasizing the importance of teacher professionalism, data informed instruction, and digital learning environments (Hu, 2024; Moallemi, 2024) Future research should explore cross cultural applications, long term learning trajectories, and the integration of artificial intelligence and data analytics to further refine adaptive learning in diverse educational settings (Estaiteyeh & DeCoito, 2023; Liang et al., 2025b; Roose et al., 2019; Saxena, 2020)

CONCLUSION

Fundamental Finding: This bibliometric study reaffirms that research on Differentiated Instruction has evolved into a mature, empirically grounded, and globally relevant field. The analysis demonstrates a clear progression from conceptual foundations toward validated classroom practices that emphasize inclusivity, personalization, and responsiveness to learner diversity. The thematic development, international collaboration patterns, and increasing presence of high-quality empirical studies collectively confirm that Differentiated Instruction now functions as a central pedagogical approach within contemporary educational discourse. These findings reinforce the study's thesis that Differentiated Instruction has transitioned into a robust instructional framework supported by sustained scholarly engagement and continuous methodological refinement. **Limitation:** Although this study provides a comprehensive overview of the development of Differentiated Instruction research, several limitations must be acknowledged. The analysis is based exclusively on Scopus-indexed publications, which may exclude relevant studies from other reputable databases. The bibliometric approach also relies on citation patterns, co-occurrence networks, and publication metadata, which may not fully capture the nuanced qualitative dimensions of Differentiated Instruction practices. Furthermore, the temporal scope and keyword selection may influence the thematic patterns identified. These limitations should be considered when interpreting the scope and generalizability of the findings. **Implications:** The findings underscore the importance of strengthening teacher professionalism, promoting assessment-informed instructional decisions, and integrating digital tools that enable adaptive and inclusive learning environments. For policymakers and educational institutions, the results highlight the need to support ongoing professional development and foster institutional cultures that promote innovation in teaching. The consolidation of Differentiated Instruction as an evidence-based framework suggests that its principles should be embedded more explicitly in teacher education curricula, instructional design processes, and school-level pedagogical policies. **Further Research:** Future research should expand beyond the limitations of this

bibliometric analysis by incorporating multiple databases and employing mixed-method approaches to capture deeper pedagogical insights. Comparative and longitudinal studies are needed to examine how Differentiated Instruction operates across cultural, institutional, and socioeconomic contexts, as well as to evaluate its long-term impact on learning trajectories. Research exploring teacher self-efficacy, implementation fidelity, and organizational environments will enrich understanding of the conditions necessary for successful application. The rapidly growing integration of artificial intelligence, learning analytics, and adaptive technologies presents significant opportunities for advancing personalized learning, and should be investigated to refine next-generation Differentiated Instruction models. Advancing this line of inquiry will not only strengthen the theoretical foundation of the field but also enhance its practical contribution to equitable and high-quality education.

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