

## **DIDACTICAL DESIGN RESEARCH: A BIBLIOMETRIC ANALYSIS**

EDI SUPRIYADI<sup>1,2</sup>, DIDI SURYADI<sup>1</sup>, T. TURMUDI<sup>1,\*</sup>, SUFYANI PRABAWANTO<sup>1</sup>, DADANG JUANDI<sup>1</sup>, JARNAWI AFGANI DAHLAN<sup>1</sup>

<sup>1</sup>Universitas Pendidikan Indonesia, Jl. Setiabudhi No. 229, Bandung, 40154, Indonesia

<sup>2</sup>Sekolah Tinggi Teknologi Bandung, Jl. Soekarno Hatta No.378, Bandung, Indonesia

\*Corresponding author: turmudi@upi.edu

### **Abstract**

This study presents a bibliometric analysis of didactical design research (DDR) publications. The study aims to provide an overview of the progress of DDR research and to identify the authors, sources, countries, affiliations, most cited documents, and research topics that affect each other. The bibliometric analysis is conducted using Scopus, Excel, and Biblioshiny. The results show that the number of DDR research projects has increased significantly from 2015 to 2022, with the Journal of Physics Conference Series being the primary publication outlet for scholars in this field. The analysis also reveals the productivity of authors, journals publishing DDR, affiliations researching DDR, most cited DDR documents, and co-citation network and thematic map analysis of DDR. The study highlights the utility of DDR in educational settings and can assist researchers and practitioners in identifying research topics, authors, and sources that are relevant to DDR.

Keywords: Bibliometric, Biblioshiny, Didactical design research, Scopus.

## 1. Introduction

Didactical design research (DDR) arose in French didactic culture in the early 1980s. DDR developed from the theory of didactic situations, which examines how teaching systems and learning processes might spread knowledge. Theoretical and applied didactical research has used DDR. Over the past 30 years, academics have adapted DDR to their theoretical culture and needs [1]. Suryadi from Universitas Pendidikan Indonesia (UPI) introduced the Indonesian DDR in 2010 [2]. Understanding educational innovation and researchers' instructional innovation activities underpins DDR [3]. DDR helps teachers learn how to teach and improve their pedagogical skills. DDR as topic areas, methodologies, and reference theories [4], while DDR can help students learn [5]. These articles suggest that didactic design research can explore topical didactics. DDR can improve teachers' professional development and pedagogical skills [2, 6]. DDR can be used for subject matter didactics and other reasons. However, no research has been done on bibliometric analysis of the DDR, especially using Biblioshiny to do mapping analysis and Scopus to find data collections. This examination is needed to find out how far and how smart DDR goes in figuring out research trends.

Due to the growth of research that has been done and published, it is important to map DDR publications as part of bibliometric analysis. The goal of this study, which is based on bibliometric analysis, is to give an overview of how DDR publications are made. This study's data give a detailed look at the progress of DDR research and can help researchers and practitioners figure out: (i) the Growth of DDR publications; (ii) the Productivity of DDR's authors; (iii) Journals publishing DDR; (iv) Affiliations researching DDR; (v) Most cited DDR documents; and (vi) Thematic Map analysis of DDR. This study is meant to help and serve as a resource for researchers, especially in the field of education, who are doing and choosing research topics.

## 2. Method

Bibliometric analysis is used in this study [7–24]. Scopus provided data for this study on March 25, 2023. The keyword was "didactical design research." Scopus' title, abstract, and keywords included "didactic\* design research." From the start of the document till data retrieval, time was unlimited. 47 DDR-related articles were found. The majority of documents were articles (12) and proceedings (35). Each article in Scopus comprises the publication year, author, author address, title, abstract, source journal, subject area, and references. \*CSV files contain 1789 publications. 1789 Scopus publications were exported to Excel. The following subjects were examined using Scopus, Excel, and Biblioshiny.

## 3. Results and Discussion

DDR frequency from 2015 to 2023 is displayed in Fig. 1. One didactic design study was done in 2015. From twelve in 2016, six investigations were conducted in 2017. Two research were published in 2018, but fourteen in 2019. Six DDR projects were published in 2020 and seven in 2021. In 2022, eight didactical design research studies reached their peak. The graphic shows two DDR probes in 2023 as of March. From 2015 to 2022, DDR research programs increased significantly.

Figure 2 displays the number of didactical design research publications throughout time. The main publication source, the Journal of Physics Conference Series, has published thirty studies. The source is the main publication venue for scholars on this topic. Four investigations are also known from the AIP Conference Proceedings. ZDM Mathematics Education, Avances De Investigacion En Educacion Matemática, Education Research International, Electronic Journal of E Learning, Eurasia Journal of Mathematics Science and Technology Education, International Journal of Learning, Teaching, and Educational Research, Journal of Engineering Science and Technology, Learning Disabilities, and Lumat were only cited once or twice. Several publications are important for DDR, even if the Journal of Physics Conference Series is the main source. This information summarizes relevant public sources to view and locate the latest DDR.

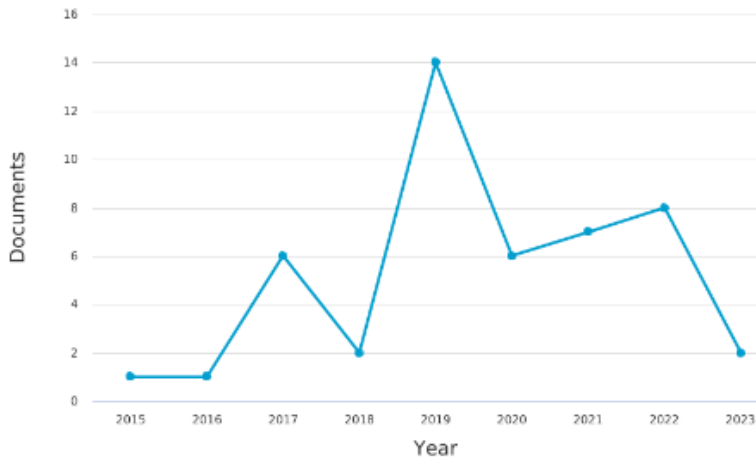


Fig. 1. Growth of DDR publications.

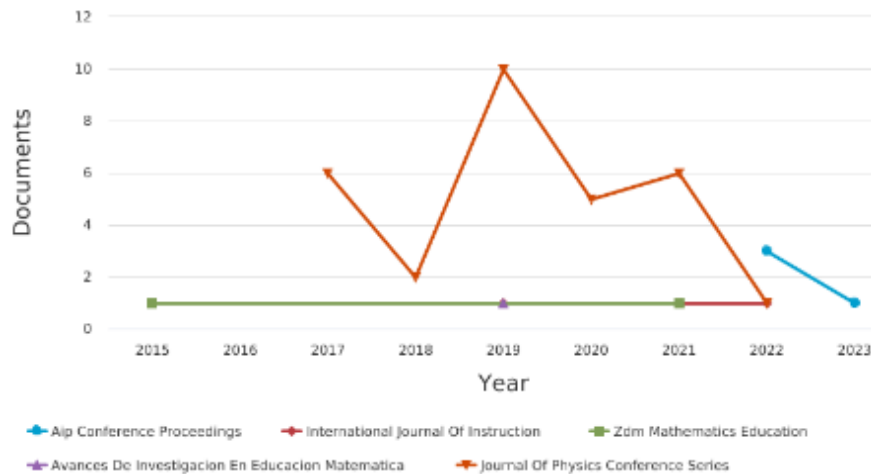
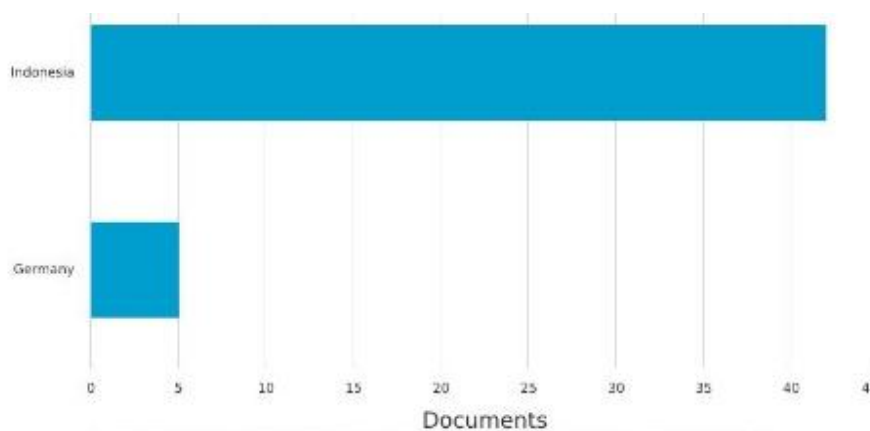


Fig. 2. Journals publishing DDR.

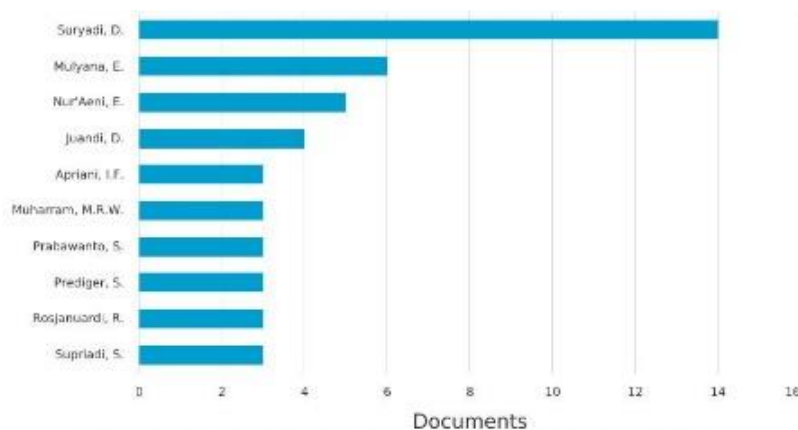
Figure 3 shows DDR publication frequency by country. Indonesia published the most DDR studies by country. Indonesia published the most DDR studies (42),

whereas Germany published five. Indonesia is becoming a research powerhouse in this industry, and interest in educational development is rising. It shows Indonesia's government supports educational research. DDR is also happening in Germany, showing that this research affects other countries. The figure can help education scholars and observers learn which countries publish the most DDR, which can help DDR develop.

The frequency of authors who publish DDR is shown in Fig. 4. The results indicate that many authors have been active in publishing research on this topic and have made substantial contributions to the advancement of knowledge in this discipline. Suryadi is the author with the most publications and has had a significant impact on the evolution of didactic design research. Mulyana and Nur'Aeni published 6 studies, Other authors published 3 studies. The data gave a summary of authors who have contributed to the advancement of didactic design research and might serve as a resource for other scholars. The future growth of DDR may be aided by the figure, which assists researchers in locating references to writers who have been engaged in publishing research in this field.

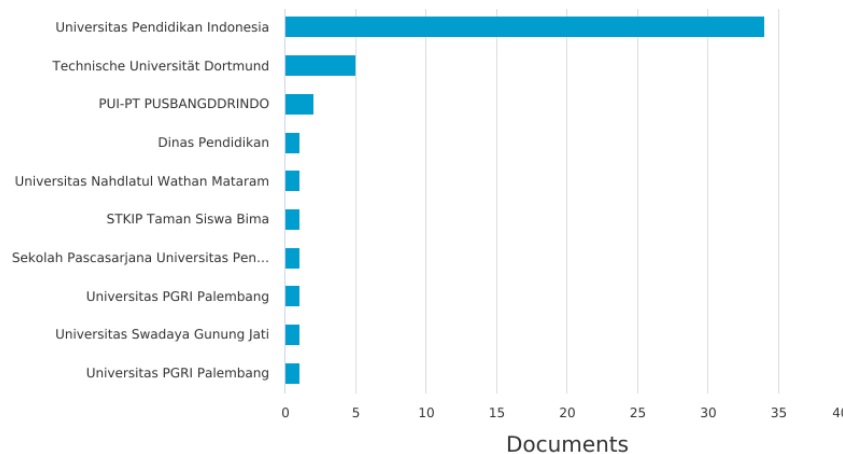


**Fig. 3. Productivity of DDR's countries.**



**Fig. 4. Productivity of DDR's authors.**

The prevalence of affiliations that have done DDR is shown in Fig. 5. The results show that a number of schools have done research in this area and made important contributions to the advancement of knowledge in this field. UPI has conducted the most studies in this sector, a total of 34, and has made a significant contribution to the growth of DDR in Indonesia. DDR has also been done by Technische Universität Dortmund, PUI-PT Pusbangddrindo, and a number of educational institutions in both Indonesia and Germany. The data can assist researchers in locating educational institutions actively undertaking study in this sector and can be used as a reference for the future development of DDR. The image provides an overview of educational institutions that conduct DDR, which can help you understand how research in this area is changing.

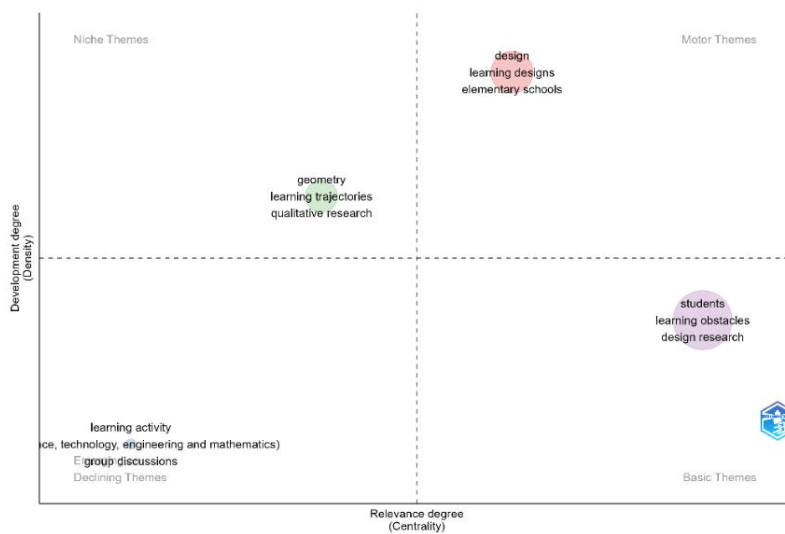


**Fig. 5. Affiliations researching DDR.**

Table 1 shows DDR's most-cited papers. Figure 6 describes the DDR thematic map with popular terms clustered. DDR includes several interconnected and impactful aspects for successful learning from various clusters. Groupings are classified according to the quadrant in which they are located [25]. The themes in the upper-right quadrant are both well-developed and crucial to the field's structure. These are referred to as the specialty's motor themes due to their great centrality and high density. The location of themes in this quadrant suggests that they are externally tied to notions relevant to other, conceptually similar themes. The terms "design", "learning design", and "elementary schools" are in this quadrant. The themes in the upper left quadrant have well-developed internal linkages but insignificant exterior ties and are therefore of marginal significance to the field. These topics are very specialized and marginal. Terms like "geometry," "learning trajectory," and "qualitative research" are used in this position. The themes in the lower left quadrant are minor and poorly developed. This quadrant's themes have low density and low centrality, primarily indicating emerging or vanishing topics. This quadrant contains the terms "learning activity", "STEM (science, technology, engineering, and mathematics)" and "group discussions". Topics in the lower right quadrant are essential to a research subject but have not yet been thoroughly explored. Hence, this quadrant groups transversal and fundamental ideas. The terms in this quadrant are "students", "learning obstacles,", and "design research".

**Table 1. Most cited documents from DDR.**

Author	Title	Cites
<b>Rohaeti et al.</b>	Developing didactic design in triangle and rectangular toward students mathematical creative thinking through visual basic for PowerPoint	13
<b>Fuadiah et al.</b>	Teaching and learning activities in classroom and their impact on student misunderstanding: a case study on negative integers	12
<b>Prediger and Krägeloh</b>	Low achieving eighth graders learn to crack word problems: a design research project for aligning a strategic scaffolding tool to students' mental processes	12
<b>Supriadi</b>	Didactic design of Sundanese ethnomathematics learning for primary school students	10
<b>Fatimah et al.</b>	Didactical design based on sharing and jumping tasks for senior high school chemistry learning	9
<b>Prediger</b>	Theorizing in design research: methodological reflections on developing and connecting theory elements for language-responsive mathematics classrooms	6
<b>Setiadi et al.</b>	Didactical design enrichment of angle in geometry	6
<b>Marfuah et al.</b>	Providing online learning situations for in-service mathematics teachers' external transposition knowledge during covid-19 pandemic: case of Indonesia	5
<b>Prediger et al.</b>	Towards a research base for textbooks as teacher support: The case of engaging students in active knowledge organization in the kosima project	5
<b>Wahyuningrum et al.</b>	Epistemological obstacles on the topic of ratio and proportion among junior high school students	5



**Fig. 6. Thematic map of DDR.**

**4. Conclusion**

DDR has experienced significant growth from 2015 to 2022, with the number of studies fluctuating each year. Indonesia has emerged as the center of research in this area, with the highest number of publications, while Germany has published fewer

studies. The Physics Conference Series journal is the main publication source for didactic design research, with other sources also playing an important role. Several authors have made significant contributions to the development of knowledge in this area, while various educational institutions have conducted didactic design research, with UPI leading the way. The most frequently cited article in didactic design research is Rohaeti. The terms "design," "learning design," and "elementary school" are well-developed and essential to the framework of the DDR study field currently. The information presented in these findings can help researchers understand the current state of DDR and contribute to future growth in this field.

## References

1. Artigue, M.; and Trouche, L. (2021). Revisiting the French didactic tradition through technological lenses. *Mathematics*, 9(6), 629.
2. Fauzi, I.; and Suryadi, D. (2020). Didactical design research untuk mengembangkan kompetensi pedagogik guru di sekolah dasar. *INVENTA: Jurnal Pendidikan Guru Sekolah Dasar*, 4(1), 58-68.
3. Prediger, S.; Gravemeijer, K.; and Confrey, J. (2015). Design research with a focus on learning processes: An overview on achievements and challenges. *ZDM*, 47, 877-891.
4. Riegel, U.; and Rothgangel, M. Designing research in subject matter didactics. Results and Open Questions of a Delphi Study. *Research in Subject-matter Teaching and Learning (RISTAL)*, 5(1), 56-77.
5. Aminudin, A.H.; Dirgantara, Y.; and Rusnayati, H. (2016). Didactical design research (ddr) pada hukum pascal berdasarkan kesulitan belajar siswa kelas X MAN Cililin Kabupaten Bandung Barat. *Journal of Teaching and Learning Physics*, 1(2), 1-9.
6. Suciawati, V.; Sudianto, S.; Jatisunda, M.G.; and Nurhikmayati, I. (2021). Didactical design research based reflection practice in teacher professional development. *Pasundan International of Community Services Journal (PICS-J)*, 3(1), 1-13.
7. Supriyadi, E. (2022). A bibliometrics analysis on mathematical thinking in indonesia from Scopus online database with affiliation from Indonesia. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika*, 4(1), 82-98.
8. Supriyadi, E. (2022). Bibliometric analysis from local instruction theory research. *Journal on Mathematics Education Research*, 3(2), 19-26.
9. Supriyadi, E.; Dahlan, J.A.; and Sugiarni, R. Analisis bibliometrik dengan vosviewer terhadap perkembangan penelitian tentang pemahaman matematika sebelum tahun 2016. *SIGMA DIDAKTIKA: Jurnal Pendidikan Matematika*, 5(1), 1-19.
10. Supriyadi, E.; Septian, A.; Dahlan, J.A.; and Juandi, D. (2022). Geogebra research in indonesia: a bibliometric analysis. *PRISMA*, 11(2), 559-575.
11. Supriyadi, E. (2022). A bibliometric analysis: computer science research from Indonesia. *TIERS Information Technology Journal*, 3(1), 28-34.
12. Supriyadi, E.; Dahlan, J.A.; Dasari, D.; Darhim, D.; and Sugiarni, R. (2022). Bibliometric analysis of learning mathematics studies from Indonesian authors. *Jurnal Kajian Pembelajaran Matematika*, 6(2), 84-95.

13. Supriyadi, E.; Dahlan, J.A.; Darhim, D.; and Taban, J. (2022). Bibliometric analysis: trend of ICT and RME researches. *Eduma: Mathematics Education Learning and Teaching*, 11(2), 139-150.
14. Supriyadi, E.; Dahlan, J.A.; and Juandi, D. (2023). Geometry in ethnomathematics research publication: bibliometric analysis. *International Journal of Mathematics and Mathematics Education*, 1(1), 18-30.
15. Supriyadi, E.; Inayah, S.; Dahlan, J.A.; and Darhim, D. (2022). Bibliometric review: elementary and mathematics education from Indonesian authors. *Profesi Pendidikan Dasar*, 9(2), 176-190.
16. Supriyadi, E.; Dahlan, J.A.; and Juandi, D. (2023). Geometry in ethnomathematics research publication: Bibliometric Analysis. *International Journal of Mathematics and Mathematics Education*, 1(1), 18-30.
17. Nandiyanto, A.B.D.; Al Husaeni, D.F. (2022). Bibliometric analysis of engineering research using vosviewer indexed by google scholar. *Journal of Engineering, Science and Technology*, 17(2), 883-894.
18. Al Husaeni, D.F.; and Nandiyanto, A.B.D. (2022). Bibliometric computational mapping analysis of publications on mechanical engineering education using vosviewer. *Journal of Engineering, Science and Technology*, 17(2), 1135-1149.
19. Nandiyanto, A.B.D.; Al Husaeni, D.N.; Al Husaeni, D.F. (2021). A bibliometric analysis of chemical engineering research using vosviewer and its correlation with Covid-19 pandemic condition. *Journal of Engineering, Science and Technology*, 16(6), 4414-4422.
20. Al Husaeni, D.N., and Nandiyanto, A.B.D. (2023). Bibliometric analysis of high school keyword using VOSviewer indexed by google scholar. *Indonesian Journal of Educational Research and Technology*, 3(1), 1-12.
21. Sahidin, I., Nohong, N., Manggau, M.A., Arfan, A., Wahyuni, W., Meylani, I., Malaka, M.H., Rahmatika, N.S., Yodha, A.W.M., Masrika, N.U.E., Kamaluddin, A., Sundowo, A., Fajriah, S., Asasutjarit, R., Fristiohady, A., Maryanti, R., Rahayu, N.I., and Muktiarni, M. (2023). Phytochemical profile and biological activities of ethylacetate extract of peanut (*Arachis hypogaea* L.) stems: In-vitro and in-silico studies with bibliometric analysis. *Indonesian Journal of Science and Technology*, 8(2), 217-242.
22. Al Husaeni, D.F., and Munir, M. (2023). Literature review and bibliometric mapping analysis: Philosophy of science and technology education. *Indonesian Journal of Multidisciplinary Research*, 3(2), 219-234.
23. Al Husaeni, D.N. (2022). Development analysis research on physics education by mapping keywords using the VOSviewer application. *ASEAN Journal of Physical Education and Sport Science*, 1(1), 9-18.
24. Firdaus, I.R., Febrianty, M.F., Awwaludin, P.N., Iلسya, M.N.F., Nurcahya, Y., and Sultoni, K. (2023). Nutritional research mapping for endurance sports: A bibliometric analysis. *ASEAN Journal of Physical Education and Sport Science*, 2(1), 23-38.
25. Cobo, M.J.; López-Herrera, A.G.; Herrera-Viedma, E.; and Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, 5(1), 146-166.