

# Bibliometric Mapping of Innovative Learning Models for Two-Variable Linear Equation Systems in Junior High School

Aminda Salsabillah<sup>1</sup>, Lilis Marina Angraini<sup>2</sup>

<sup>1,2</sup> Mathematics Education Study Program, Islamic University of Riau, Pekanbaru

## Article Info

### Article history:

Received January 16, 2026

Revised July 3, 2026

Accepted July 26, 2026

### Keywords:

Bibliometric Analysis

Contextual Teaching and Learning;

Google Scholar;

Problem-Based Learning;

Two-variable linear equation systems

## ABSTRACT

This study maps publication growth, conceptual structure, and emerging themes in research on innovative learning models for two-variable linear equation systems at the junior high school level. A descriptive bibliometric design was applied to Google Scholar records retrieved on 21 October 2025 using Publish or Perish 8.17.4863.9118 and analyzed with VOSviewer 1.6.20. The search returned 994 records and 4,241 citations; 962 records contained complete publication-year metadata for trend analysis. Publications increased from 132 in 2021 to a peak of 232 in 2023, followed by 225 in 2024 and 170 in the partial 2025 dataset. Co-occurrence mapping retained 59 terms in six clusters. The most substantive themes concerned Contextual Teaching and Learning, mathematical problem solving, student worksheets, realistic mathematics, creative problem solving, and self-efficacy. Generic phrases in the map also revealed metadata noise inherent in Google Scholar text mining. The findings suggest a shift from model comparison toward contextual, digitally supported, problem-oriented, and affect-sensitive learning. The study contributes a transparent research agenda that combines bibliometric evidence with pedagogical theory and Islamic educational values of knowledge, justice, collaboration, and responsible learning.

This is an open access article under the [CC BY-SA](#) license.



## Corresponding Author:

Aminda Salsabillah

e-mail: [amindasalsabillah@student.uir.ac.id](mailto:amindasalsabillah@student.uir.ac.id),

## INTRODUCTION

Two-variable linear equation systems constitute a central algebra topic in junior high school because they connect symbolic manipulation, graphical representation, mathematical modelling, and everyday decision making. Students are expected to translate verbal situations into two equations, select an appropriate solution strategy, and interpret the ordered pair in the original context. These demands make the topic more than a procedural exercise. It is a setting in which conceptual understanding, representation, reasoning, and problem solving must operate together. Nevertheless, empirical studies continue to report errors in reading contextual information, constructing mathematical models, choosing procedures, drawing graphs, and communicating final answers (Sari et al., 2022; Putri et al., 2025). Such findings indicate that conventional explanation followed by repetitive exercises is often insufficient for developing relational understanding.

Innovative learning models have therefore become an important direction in mathematics education. Contextual Teaching and Learning (CTL) connects formal ideas to meaningful situations, while Problem-Based Learning (PBL) organizes learning around complex problems that require inquiry, collaboration, and justification. Realistic Mathematics Education (RME) begins with experientially real contexts and guides students toward progressive mathematization. Digital modules, interactive media, and student worksheets can further support visualization and multiple representations. Studies on two-variable linear equation systems have reported the feasibility of Android-based CTL modules, RME-oriented lesson plans and worksheets, and PBL

combined with realistic mathematics approaches (Khasanah et al., 2021; Zetriuslita et al., 2022; Supit et al., 2023). These approaches are theoretically compatible with situated learning, constructivism, and learner-centred inquiry (Lave & Wenger, 1991; Johnson, 2002; Hmelo-Silver, 2004; Savery, 2006).

The rapid accumulation of studies, however, creates a second problem: the evidence is dispersed across journals, proceedings, repositories, and institutional publications. Narrative reviews can summarize selected studies, but they are less effective for revealing publication growth, conceptual relationships, and emerging topics in a large corpus. Bibliometric analysis addresses this need by combining performance indicators with science mapping. It enables researchers to identify the evolution of a field, influential themes, patterns of co-occurrence, and underexplored directions (Zupic & Čater, 2015; Donthu et al., 2021). VOSviewer is particularly useful for constructing and visualizing bibliometric networks, including term co-occurrence maps (van Eck & Waltman, 2010; Perianes-Rodriguez et al., 2016).

Bibliometric studies have been conducted on critical thinking in mathematics learning, discovery learning, e-learning, and emerging educational technologies (Habibi et al., 2022; Muhammad et al., 2023; Muhammad & Juandi, 2023; Rakhmawati et al., 2023). These studies demonstrate the value of bibliometric mapping, but they examine broad pedagogical constructs rather than a specific algebra topic. The present study differs by focusing on innovative learning models for two-variable linear equation systems at the junior high school level. This topic-specific focus is important because the instructional demands of modelling, elimination, substitution, graphing, and interpretation may generate a research structure that cannot be inferred from general mathematics education maps. The novelty of this study lies in integrating publication performance, term-network interpretation, pedagogical theory, and an Islamic educational lens within a single topic-specific analysis.

Islamic education views the pursuit of knowledge as an intellectual and ethical responsibility. The Qur'an states: "Believers, when you are told to make room in gatherings, make room; God will make room for you. When you are told to rise, then rise. God raises in rank those of you who believe and those who have been given knowledge. God is fully aware of what you do" (Qur'an 58:11). In mathematics education, this orientation encourages learning designs that are not evaluated only by efficiency, but also by fairness, cooperation, intellectual honesty, and respect for learners. Qur'an-integrated mathematics resources have shown that disciplinary learning can be developed together with religious values rather than treating the two as separate domains (Kartika & Maryam, 2025). Accordingly, the bibliometric trends in this study are interpreted in relation to equitable participation, collaborative responsibility, and the ethical use of knowledge.

This study addresses three questions: (1) How did publications and citation indicators on innovative learning models for two-variable linear equation systems develop from 2021 to 2025? (2) What conceptual clusters and emerging themes are visible in the VOSviewer network, overlay, and density maps? (3) What pedagogical, research, and Islamic educational implications can be derived from these trends? The study aims to provide a reproducible overview for researchers and a practical evidence base for teachers selecting contextual, problem-oriented, and technology-supported strategies.

## **METHOD**

This study used a descriptive quantitative bibliometric design. Bibliometric analysis was selected because it can summarize a large body of publication metadata and reveal the conceptual structure of a research field through performance analysis and science mapping (Donthu et al., 2021). The workflow followed the general stages of defining the topic, retrieving records, cleaning and organizing metadata, generating bibliometric indicators, producing visual maps, and interpreting the results in relation to learning theory and previous research.

Data were retrieved from Google Scholar on 21 October 2025 through Harzing's Publish or Perish, Windows GUI Edition, version 8.17.4863.9118. The search used the Indonesian phrase "Model Pembelajaran Inovatif dalam materi SPLDV" and limited publication years to 2021-2025, with a maximum of 1,000 results. Google Scholar was chosen because it provides broad coverage of Indonesian-language journals, proceedings, theses, and institutional repositories that are often underrepresented in curated international databases. This breadth is useful for mapping local mathematics education research, although Google Scholar metadata requires cautious interpretation because coverage, source quality, and citation counts are not fully standardized (Halevi et al., 2017; Martín-Martín et al., 2018).

The eligibility framework included scholarly records in Indonesian or English that contained identifiable bibliographic metadata and addressed learning models, approaches, media, worksheets, or instructional strategies related to two-variable linear equation systems. Records outside the 2021-2025 period, records without identifiable titles or authors, duplicate entries, and records unrelated to the topic after title-level inspection were not considered eligible for substantive interpretation. Access status was not used as an

exclusion criterion because Google Scholar indexes both open and restricted records. The search produced 994 records and 4,241 citations. Of these, 962 records contained complete publication-year metadata and were used for annual trend analysis; the remaining 32 records had blank or incomplete year fields. The full retrieved corpus was retained for the citation indicators reported by Publish or Perish.

Metadata were exported in RIS format and examined using VOSviewer version 1.6.20, the version available at the time of data collection. The supplied VOSviewer project retained 59 terms organized into six clusters and generated network, overlay, and density visualizations. Term size was interpreted as relative occurrence, link proximity as conceptual association, cluster colour as thematic grouping, overlay colour as average publication year, and density as concentration of connected terms. Because the exact minimum-occurrence threshold was not preserved in the source manuscript, the interpretation emphasizes relative structures and recurring substantive terms rather than claiming exact term-frequency cut-offs. Synonymous labels such as SPLDV and two-variable linear equation systems were conceptually harmonized during interpretation, while generic phrases were treated as metadata noise rather than research themes.

Reliability was strengthened through internal cross-checking among the Publish or Perish screenshot, the citation table, the annual publication totals, and the VOSviewer visualizations. The raw total of 994 records was distinguished from the 962 records with complete year metadata, resolving the inconsistency in the original manuscript. Quantitative indicators were reported according to their correct labels: citations per paper, papers per author, authors per paper, h-index, and g-index. The findings were then interpreted using CTL, PBL, RME, self-efficacy, situated learning, and Islamic educational principles. This interpretive step does not change the bibliometric results; it explains their educational significance.

Based on Figure 1, the initial search was conducted using *Harzing's Publish or Perish* software with a limit of 1000 journals. However, only 962 journals met the criteria for further analysis. The number of journals analyzed has an effect on how detailed the maps are produced; The more journals involved, the more complete the map will be. In addition, there is quantitative data on article citations that can be seen in the citation marks in the image. The following is an explanation of the results of the citation marks that have been obtained.

**Table 1.** Search protocol and analytical scope

| Element                    | Specification                                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Database                   | Google Scholar                                                                                                                    |
| Search date                | 21 October 2025                                                                                                                   |
| Search query               | “Model Pembelajaran Inovatif dalam materi SPLDV”                                                                                  |
| Publication period         | 2021-2025                                                                                                                         |
| Software                   | Publish or Perish 8.17.4863.9118; VOSviewer 1.6.20                                                                                |
| Retrieved records          | 994 records; 4,241 citations                                                                                                      |
| Trend-analysis records     | 962 records with complete publication-year metadata; 32 records with missing year metadata                                        |
| Mapping output             | 59 terms in six clusters; network, overlay, and density visualizations                                                            |
| Language and document type | Indonesian or English scholarly records; journal articles, proceedings, theses, and repository records with identifiable metadata |

## RESULTS AND DISCUSSION

### Dataset Profile and Publication Growth

Publish or Perish retrieved 994 records with 4,241 citations. The corpus had an h-index of 29 and a g-index of 44, indicating that a meaningful subset of publications had accumulated repeated citations. The correct average was 4.27 citations per paper, while 577.52 represented papers per author rather than citations per article. Correcting this label is important because the original interpretation overstated citation intensity. The metrics indicate a broad, collaborative, and unevenly cited literature rather than an average of hundreds of citations per paper.

**Table 2.** Publish or Perish citation indicators

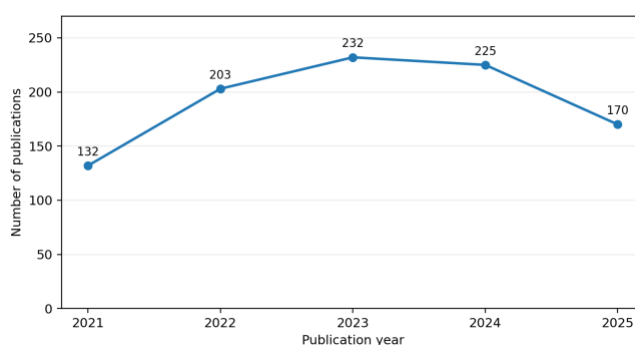
| Indicator           | Value    |
|---------------------|----------|
| Retrieved papers    | 994      |
| Total citations     | 4,241    |
| Citations per year  | 1,060.25 |
| Citations per paper | 4.27     |
| Papers per author   | 577.52   |
| Authors per paper   | 2.21     |
| h-index             | 29       |
| g-index             | 44       |
| Individual h-index  | 17       |
| Annual h-index      | 4.25     |
| hA-index            | 16       |

Source: Publish or Perish search results, 21 October 2025.

The annual trend was calculated from 962 records with complete year metadata. Publications rose from 132 in 2021 to 203 in 2022 and reached a peak of 232 in 2023. The total remained high in 2024 at 225 publications. The 2025 count was 170, but this value should not be interpreted as a definitive decline because the search was conducted before the end of the year and Google Scholar indexing is not instantaneous. The more defensible conclusion is that research activity accelerated through 2023 and remained substantial in 2024-2025.

**Table 3.** Annual publication distribution for records with complete year metadata

| Year         | Publications | Percentage     |
|--------------|--------------|----------------|
| 2021         | 132          | 13.72%         |
| 2022         | 203          | 21.10%         |
| 2023         | 232          | 24.12%         |
| 2024         | 225          | 23.39%         |
| 2025         | 170          | 17.67%         |
| <b>Total</b> | <b>962</b>   | <b>100.00%</b> |

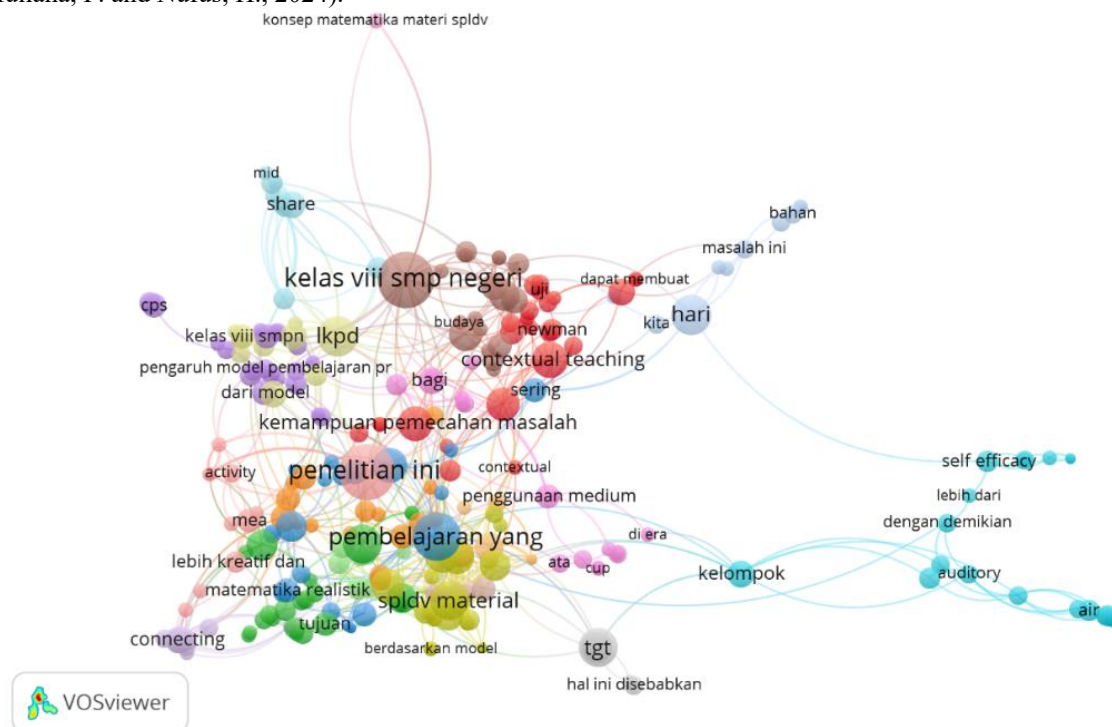
**Figure 1.** Development of scientific publications from 2021 to 2025

Source: Authors' processing of 962 records with complete publication-year metadata.

### Conceptual Structure in the Network Visualization

The network visualization retained 59 terms distributed across six clusters. The largest and most central substantive nodes included contextual teaching, mathematical problem-solving ability, student worksheets (LKPD), Grade VIII junior high school, realistic mathematics, and SPLDV material. Their central positions indicate that research on innovative models is organized primarily around helping Grade VIII students connect algebraic procedures with contextual problems and structured learning resources. This pattern is consistent with empirical work showing that contextual modules and realistic mathematics learning tools can make

abstract representations more accessible (Khasanah et al., 2021; Zetriuslita et al., 2022; Faisal, et al., 2025; Muliana, F. and Nufus, H., 2024).



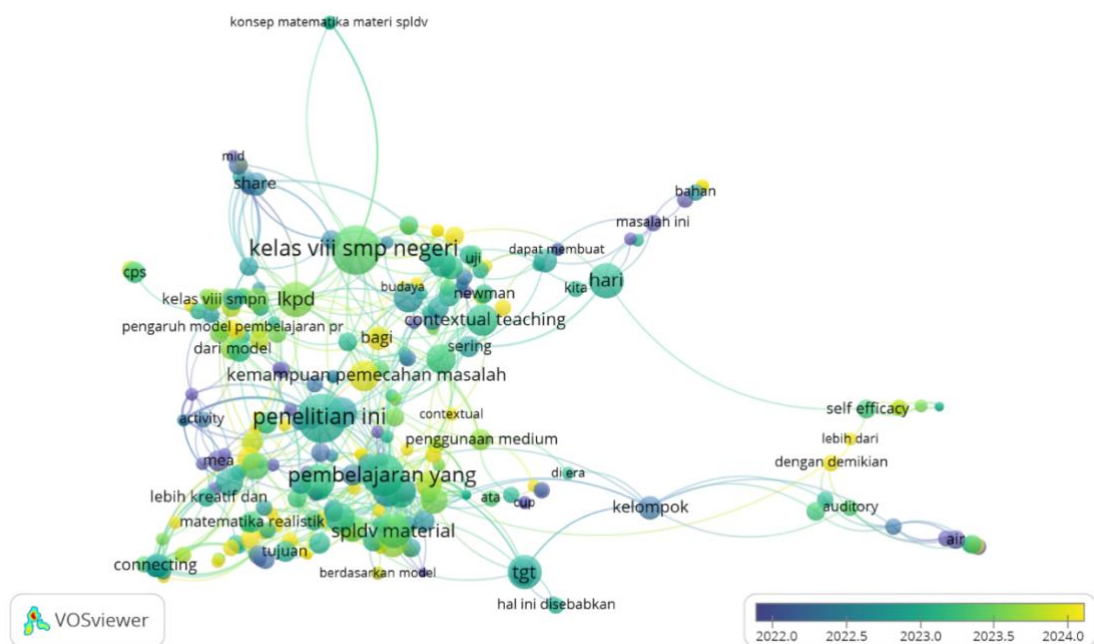
**Figure 2.** Network visualization of term co-occurrence in innovative SPLDV learning research

*Source: Authors' processing using VOSviewer 1.6.20.*

The map also contains high-frequency generic phrases such as “this research,” “learning that,” and fragments of sentences. These terms should not be interpreted as intellectual themes. Their presence reflects the use of automatically extracted textual metadata from heterogeneous Google Scholar records. The distinction between substantive and generic terms is analytically important: without cleaning, large generic nodes can obscure the actual conceptual structure. The substantive network can be summarized into five connected strands: contextual and problem-oriented learning; teaching materials and LKPD; realistic mathematics and modelling; creativity and Creative Problem Solving; and affective factors such as self-efficacy and learning styles. A sixth group mainly contains generic or weakly informative textual fragments.

### Temporal Movement in the Overlay Visualization

The overlay visualization places the average publication year on a continuum from approximately 2022 to 2024. Earlier terms tend to be associated with general learning-model comparisons and classroom activity, whereas newer yellow-green nodes are more closely related to contextual teaching, problem solving, self-efficacy, and media-supported learning. This temporal pattern suggests that the field is moving beyond asking whether an innovative model improves scores. Recent studies increasingly examine how learning designs support modelling, confidence, creativity, and engagement. The shift is pedagogically meaningful because success in two-variable linear equation systems depends on both cognitive processes and students' willingness to persist through multi-step problems.



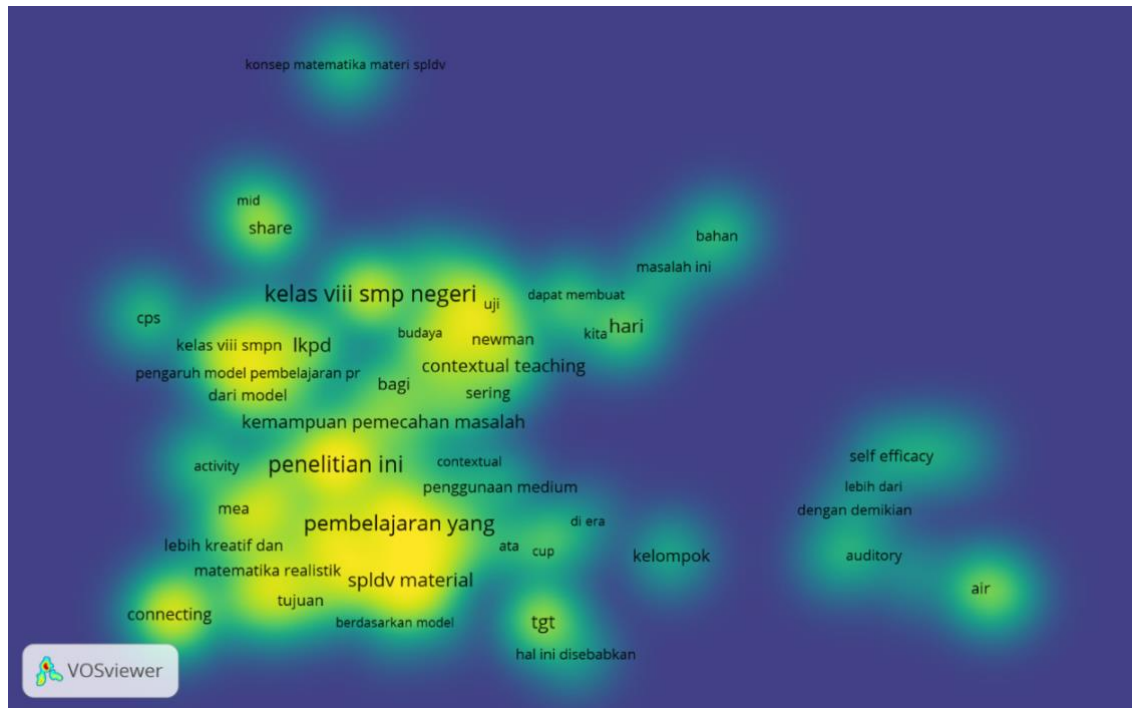
**Figure 3.** Overlay visualization of the average publication year of terms

*Source: Authors' processing using VOSviewer 1.6.20.*

Problem-oriented approaches, including PBL, are theoretically positioned to support this shift. PBL requires learners to formulate what is known, identify what must be found, select representations, test strategies, and justify solutions (Hmelo-Silver, 2004; Savery, 2006). In an SPLDV lesson, a contextual pricing, mixture, or ticketing problem can be used to generate two variables and two constraints. Students can compare elimination, substitution, and graphing, then evaluate whether the resulting ordered pair is meaningful. CTL reinforces this process by anchoring algebra in situations familiar to learners, while RME emphasizes guided reinvention and progressive mathematization (Freudenthal, 1991; Gravemeijer & Doorman, 1999; Nisa, et al., 2022).

### Research Density and Underdeveloped Themes

The density map confirms that the most concentrated area concerns Grade VIII, SPLDV material, contextual teaching, and problem-solving ability. These topics form the established core of the field. By contrast, self-efficacy, auditory learning, and several technology-related terms occupy peripheral or less dense positions. A peripheral location does not imply that a theme is unimportant; it indicates that the theme is less integrated into the dominant literature. Self-efficacy is especially promising because it affects persistence, strategic choice, and resilience when students encounter demanding tasks (Bandura, 1997; Zimmerman, 2000). Future studies should therefore examine whether contextual, digital, or problem-based SPLDV interventions improve not only achievement but also confidence, mathematical communication, and willingness to revise unsuccessful strategies.



**Figure 4.** Density visualization of recurring terms in the research corpus  
*Source: Authors' processing using VOSviewer 1.6.20.*

### Pedagogical and Islamic Educational Implications

The bibliometric clusters can be translated into concrete instructional decisions. CTL and RME are appropriate when teachers want students to construct equations from realistic situations. PBL is useful when the goal is to compare strategies and defend reasoning. LKPD and digital media can scaffold representations by organizing tables, graphs, equations, and reflection prompts. Creative Problem Solving can extend routine exercises into open tasks with multiple solution routes. Self-efficacy should be supported through attainable challenges, feedback focused on strategy, and opportunities for students to explain improvement rather than merely display correct answers. These implications align with the National Council of Teachers of Mathematics' emphasis on reasoning, problem solving, representation, discourse, and equitable access to meaningful mathematics (NCTM, 2014).

**Table 4.** Major thematic strands and implications for learning and research

| Thematic strand                          | Representative terms                                 | Classroom implication                                                                     | Research opportunity                                                                    |
|------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Contextual and problem-oriented learning | contextual teaching; problem-solving ability; Newman | Use realistic problems to generate equations, compare strategies, and justify solutions.  | Test CTL/PBL effects on modelling transfer, and mathematical communication.             |
| Learning resources and digital support   | LKPD; media; Grade VIII                              | Integrate tables, graphs, equations, and feedback in worksheets or interactive media.     | Compare digital and print scaffolds; examine accessibility and cognitive load.          |
| Realistic mathematics and modelling      | realistic mathematics; SPLDV material                | Guide students from contextual situations to informal and formal models.                  | Study progressive mathematization and transfer to unfamiliar contexts.                  |
| Creativity and flexible reasoning        | CPS; creative; connecting                            | Invite multiple solution methods and evaluation of efficiency and validity.               | Measure flexibility, originality, and explanation quality.                              |
| Affective and learner factors            | self-efficacy; learning style; group                 | Provide strategy-focused feedback and collaborative roles that build confidence.          | Examine self-efficacy as mediator or outcome of innovative instruction.                 |
| Islamic educational integration          | knowledge; justice; cooperation; responsibility      | Design equitable group participation, honest reasoning, and socially meaningful problems. | Develop and test Islamic-integrated SPLDV modules and ethical digital learning designs. |

An Islamic educational reading adds a value dimension that is almost absent from the visible keyword map. No prominent term explicitly represents Islamic values, suggesting that integration remains an underdeveloped research direction rather than an established theme. The principle of elevating knowledge in Qur'an 58:11 can be operationalized through intellectually serious learning, while justice requires that innovative models provide meaningful participation for students with different levels of prior knowledge. Cooperation can be developed through accountable group roles, and intellectual honesty through explicit justification of mathematical models and rejection of unsupported answers. These values should not be attached as decorative quotations; they should shape task design, interaction, assessment, and the responsible use of digital tools. The Qur'an-integrated e-module developed by Kartika and Maryam (2025) illustrates how mathematical content and Islamic values can be designed as a coherent learning experience.

### Limitations and Future Research Agenda

Several limitations qualify the findings. First, the study uses only Google Scholar, whose broad coverage is valuable for Indonesian scholarship but includes heterogeneous document types and inconsistent metadata. Second, the Indonesian search phrase may omit English-language studies using different terminology. Third, the five-year window is short, and the 2025 count is incomplete. Fourth, 32 records lacked usable publication-year metadata. Fifth, the VOSviewer project did not preserve the exact minimum-occurrence threshold, and generic phrases remained in the text-mining output. Sixth, citation counts are dynamic and should not be interpreted as fixed quality measures. These limitations mean that the results describe the searchable Google Scholar landscape rather than a complete census of peer-reviewed research.

Future bibliometric studies should combine Google Scholar with Scopus, Web of Science, Dimensions, or OpenAlex; use bilingual and synonym-rich search strings; document screening with a transparent flow diagram; preserve thesaurus and threshold files; and distinguish journals, proceedings, theses, and repositories. Topic-specific studies can examine co-authorship and citation structures, while classroom research should experimentally test themes that remain peripheral in the map. Particularly valuable directions include digital CTL worksheets, PBL-RME combinations, learning analytics, self-efficacy as a mediator, and Islamic-integrated SPLDV modules that evaluate conceptual understanding, fairness of participation, collaboration, and ethical technology use.

## CONCLUSION

Research on innovative learning models for two-variable linear equation systems expanded substantially from 2021 to 2025. Publish or Perish retrieved 994 records with 4,241 citations, while 962 records with complete year metadata showed a publication peak in 2023 and sustained activity thereafter. VOSviewer organized 59 terms into six clusters, with the substantive core centred on contextual teaching, mathematical problem solving, LKPD, realistic mathematics, creativity, and self-efficacy. The network therefore indicates a movement from simple comparisons of teaching models toward contextual, problem-oriented, digitally supported, and affect-sensitive learning. For teachers, the practical implication is to select models according to the intended learning process: CTL and RME for modelling, PBL for inquiry and justification, digital worksheets for representation and scaffolding, and self-efficacy support for persistence. For researchers, the most promising agenda involves rigorous multi-database mapping and experimental studies of underdeveloped themes, particularly affective outcomes, technology integration, and Islamic educational values. Future Islamic-integrated SPLDV designs should connect knowledge with justice, cooperation, intellectual honesty, and responsible learning rather than treating religious values as an additional label.

## ACKNOWLEDGMENTS

The authors thank the Mathematics Education Study Program, Faculty of Teacher Training and Education, Universitas Islam Riau, for academic support. Appreciation is also extended to the reviewers whose comments improved the methodological consistency, analytical depth, and presentation of this manuscript.

## REFERENCES

- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285-296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Faisal, F., Anggreni, F., Husna, R. (2025). Efektivitas Model Problem Based Learning Berbantuan Video Pembelajaran Di Smp Negeri 1 Langsa. *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika*, Vol.5 No.2 Januari 2025. <https://doi.org/10.47766/Arriyadhiyyat.V5i2.4193>
- Freudenthal, H. (1991). Revisiting mathematics education: China lectures. Kluwer Academic Publishers.
- Gravemeijer, K., & Doorman, M. (1999). Context problems in realistic mathematics education: A calculus course as an example. *Educational Studies in Mathematics*, 39, 111-129. <https://doi.org/10.1023/A:1003749919816>
- Habibi, F., Fitriana, A., & Sulityowati, E. (2022). Pemetaan bibliometrik terhadap perkembangan penelitian e-learning pada Google Scholar menggunakan VOSviewer. *Attractive: Innovative Education Journal*, 4(2), 383-395. <https://doi.org/10.51278/aj.v4i2.505>
- Halevi, G., Moed, H., & Bar-Ilan, J. (2017). Suitability of Google Scholar as a source of scientific information and as a source of data for scientific evaluation: Review of the literature. *Journal of Informetrics*, 11(3), 823-834. <https://doi.org/10.1016/j.joi.2017.06.005>
- Harzing, A.-W. (2007). Publish or Perish. <https://harzing.com/resources/publish-or-perish>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235-266. <https://doi.org/10.1023/B:EDPR.0000034022.16470.f3>
- Johnson, E. B. (2002). Contextual teaching and learning: What it is and why it is here to stay. Corwin Press.
- Kartika, S., & Maryam, I. (2025). Development and evaluation of a Qur'an-integrated interactive mathematics e-module to enhance learning interest in integers. *Ar-Riyadhiyyat: Journal of Mathematics Education*, 6(1), 39-46. <https://doi.org/10.47766/arriyadhiyyat.v6i1.5969>
- Khasanah, U., Rahayu, W., & Rohimah, S. R. (2021). Pengembangan modul pembelajaran matematika berbasis Android dengan pendekatan Contextual Teaching and Learning pada materi sistem persamaan linear dua variabel. *Jurnal Riset Pembelajaran Matematika Sekolah*, 5(2), 85-93. <https://doi.org/10.21009/jrpms.052.10>
- Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge University Press.

- Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & Delgado López-Cózar, E. (2018). Google Scholar, Web of Science, and Scopus: A systematic comparison of citations in 252 subject categories. *Journal of Informetrics*, 12(4), 1160-1177. <https://doi.org/10.1016/j.joi.2018.09.002>
- Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics*, 106, 213-228. <https://doi.org/10.1007/s11192-015-1765-5>
- Muhammad, I., Himmawan, D. F., Mardiyah, S., & Dasari, D. (2023). Analisis bibliometrik: Fokus penelitian critical thinking dalam pembelajaran matematika (2017-2022). *Jurnal Pembelajaran Matematika Inovatif*, 6(1), 19-32. <https://doi.org/10.22460/jpmi.v6i1.14759>
- Muhammad, I., & Juandi, D. (2023). Discovery learning research in mathematics learning (1968-2023): A bibliometric review. *Hipotenusa: Journal of Mathematical Society*, 5(2), 197-214. <https://doi.org/10.18326/hipotenusa.v5i2.396>
- Muliana, Fonna, M., Nufus, H. (2024). Pengaruh Penerapan Problem Based Learning (PBL) Terhadap Keterampilan Abad 21. *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika*, Vol.5 No.1 Juli 2024. <https://doi.org/10.47766/arriyadhiyyat.v5i1.2900>
- National Council of Teachers of Mathematics. (2014). Principles to actions: Ensuring mathematical success for all. Author.
- Nisa, S., Anwar, N., dan Al Husaini, M. D. (2022). Penerapan Pendekatan Problem Based Learning dalam Meningkatkan Hasil Belajar Siswa pada Materi Perbandingan. *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika*, Vol.2 No.2 Januari 2022. <https://doi.org/10.47766/arriyadhiyyat.v2i2.178>
- Perianes-Rodriguez, A., Waltman, L., & van Eck, N. J. (2016). Constructing bibliometric networks: A comparison between full and fractional counting. *Journal of Informetrics*, 10(4), 1178-1195. <https://doi.org/10.1016/j.joi.2016.10.006>
- Putri, J. H., Amalia, P., Safirah, D., Agustina, R., & Nasution, A. P. (2025). Analisis kesalahan siswa pada materi sistem persamaan linear dua variabel ditinjau dari kemampuan awal matematika. *JagoMIPA: Jurnal Pendidikan Matematika dan IPA*, 5(2), 439-448. <https://doi.org/10.53299/jagomipa.v5i2.1523>
- Rakhmawati, N. A., Irfan, M., Septiadi, Y., & Rivandra, M. A. (2023). Analisis bibliometrik publikasi tentang ChatGPT. *Journal of Information Engineering and Educational Technology*, 7(2), 92-97. <https://doi.org/10.26740/jieet.v7n2.p92-97>
- Sari, W. I., Santosa, C. A. H. F., & Iskandar, K. (2022). Kesulitan siswa dalam menyelesaikan soal sistem persamaan linier dua variabel berdasarkan teori pemahaman Skemp. *Laplace: Jurnal Pendidikan Matematika*, 5(2), 354-369. <https://doi.org/10.31537/laplace.v5i2.857>
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 9-20. <https://doi.org/10.7771/1541-5015.1002>
- Supit, C. M., Sulistyaningsih, M., & Kaunang, D. F. (2023). Penerapan model Problem Based Learning dengan pendekatan Pendidikan Matematika Realistik dalam pembelajaran matematika materi sistem persamaan linear dua variabel. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 7(3), 2932-2940. <https://doi.org/10.31004/cendekia.v7i3.2583>
- van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538. <https://doi.org/10.1007/s11192-009-0146-3>
- Zetriuslita, Z., Suripah, S., Dahlia, A., & Rohana, I. (2022). Validitas perangkat pembelajaran matematika berbasis Realistic Mathematic Education pada materi persamaan linear dua variabel kelas VIII SMP. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 6(2), 1360-1373. <https://doi.org/10.31004/cendekia.v6i2.1345>
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25(1), 82-91. <https://doi.org/10.1006/ceps.1999.1016>
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429-472. <https://doi.org/10.1177/1094428114562629>